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THE EFFLUENT CHARGE SYSTEM IN THE FEDERAL REPUBLIC OF GERMANY

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PREFACE

In 1982, the United States Environmental Protection Agency and the Ministry of Interior of the Federal Republic of Germany approached the German Marshall Fund of the United States with an unusual request. Each government was making some progress cleaning up the air and public waters by using a distinct, new regulatory approach based strictly on cost-saving incentives, rather than stringent and cumbersome regulations. Each government wanted to learn more about the other's unique methodology, successes and problems. Both governments asked the German Marshall Fund to facilitate a cooperative project to develop information on the U.S. emissions trading policy and the German effluent charge system. The bilateral project--set up under the terms of the U.S.-FRG Environmental Agreement of 1974--developed two extensive research reports, identified below.

As facilitator, the German Marshall Fund of the United States provided financial support to cover travel and meeting expenses and helped coordinate research activities and interactions with Advisory Panels on both sides of the Atlantic. The Fund is an independent, American organization established in 1972 by a gift from the Federal Republic of Germany as a Memorial to the Marshall Plan; this project is one example of the special role it has played in furthering the exchange of practical policy experience among industrialized countries.

The members of the Advisory Panels:

United States

Joseph Cannon, Associate Administrator for Policy and Resource Management, U.S. EPA, Washington, D.C.

Christopher DeMuth, Administrator for Information and Regulatory Affairs in the Office of Management and Budget, Washington, D.C.

Allen Kneese, Senior Economist, Resources for the Future, Washington, D.C.

Marvin Kosters, Director, Center for the Government Regulations, American Enterprise Institute, Washington, D.C.

Federal Republic of Germany

Gerhard Feldhaus, Director, Office of Environmental Policy and Emissions Control, Federal Ministry of the Interior, Bonn

Walter Loetz, Deputy Director, Federal Ministry of Economics, Bonn

Franz-Josef Dreyhaupt, Deputy Director, Ministry of Labor, Health, and Welfare, Land Nordrhein-Westfalia, Dusseldorf

Jurgen Salzwedel, Director, Study Institute for Public Policy, University Bonn

Charles Malloch, Regulatory Management Director, Monsanto Corporation, St. louis, Missouri

Michael DeBusschere, Air Pollution Control Officer, Louisville, Kentucky

Horst Siebert, Professor, University Mannheim

Malte Faber, Professor, University Hiedelberg

Martin Uppenbrink, Director, Department of Environmental Planning, Umweltbundesamt (ex officio), Berlin

Two research reports were produced:

The Emissions Trading Policy in the United States of America: An Evaluation of its Advantages and Disadvantages and Analysis of its Applicability in the Federal Republic of Germany, Eckard Rehbinder, Professor of Law, at the J.W. Goethe University, Frankfurt; Rolf-Ulrich Sprenger, Senior Fellow, Institute for Economic Research (IFO Munich).

The Effluent Charge System in the Federal Republic of Germany, Gardner M. Brown, Professor of Economics, and Ralph W. Johnson, Professor of Law, University of Washington, Seattle.

Copies of these publications can be obtained in the United States through the EPA and in Germany through the Federal Ministry of Interior and the Institute for Economic Research (IFO Munich). Both documents are available in English and German.

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1 . Executive Summary

In response to growing public demand for environmental quality in the early 1970s, the Federal Republic of Germany (FRG) in 1976 enacted an effluent charge law for controlling water pollution. This law, operating in combination with the existing standards/regulatory system, is based on the polluter-pays principle adopted by the OECD (Council of the Organization for Economic Cooperation and Development) in 1972. Firms, cities and others must pay for the cost of pollution control when they discharge wastes into public waters. The charge is levied on 5 significant pollutants and generally is proportional to the amount of the waste discharge. Although the actual charge is lower than abatement costs in many instances, it has proven to be high enough to provide an incentive to reduce substantially waste discharges into public waters. As a consequence, compliance as well as water quality has improved and the costs of enforcement have decreased.

The revenues from the federal effluent charge system accrue to the states (Laender) and are available to pay the costs of water pollution administration, research, construction of pollution control facilities, and for related purposes.

This charge system has brought about increased efficiency in water quality administration among the states, which has led to more equitable treatment for industrial branches and municipalities across the FRG. The new system has met with considerable enthusiasm in the Federal Republic of Germany, even among firms and administrators initially skeptical about the practicality of the "economic point of view."

The German experience is especially relevant in the United States because: (1) The FRG is a federation with the states reserving substantial powers--even more than in the United States; (2) The FRG had an existing standards/regulatory system as the United States now does and enacted the effluent charge law to work in tandem with that system; and (3) an effluent charge system is consistent with the Reagan administration's "user pay" philosophy, i.e., those who use the rivers and lakes of the nation for waste disposal should pay for the costs imposed on the public by such use.

2. Introduction

The 1976 enactment in the Federal Republic of Germany of an Effluent Charge Law (ECL) has rekindled interest in this concept in the United States. Long touted by economists, the effluent charge notion has never received much political support in this country. The German law and experience is particularly interesting to the United States because both nations are highly industrialized, both have continuing water pollution control problems, and both are federal nations with substantial powers of government held by the states.

This study is designed to describe the FRG effluent charge law and the political and legal background that permitted such a law to be enacted there. We also evaluate the impact of that law, although our assessment is necessarily tentative in view of the short experience with the law there to date.

The study then analyzes the economic and legal implications of enacting an effluent charge law in the United States. We consider the advantages and disadvantages of state vs. federal enactment, the constitutional objections that might be raised to such a law, and how it might be related to and coordinated with existing pollution control laws in the United States.

3. The History of Water Management In The FRG

While the United States has been united as a nation-state since 1779, Germany was not united until 1871. Even after the 1871 unification many important areas of domestic policy, including water quality management, remained in the local governments where they had been traditionally. During the 1800s and early 1900s the few water quality laws that were enacted in Germany appeared at the city and town level. Water laws passed by the Laender such as the Badische Water Law of 1899, the Bavarian Water Law of 1907, and the Prussian Water Law of 1913, primarily regulated ownership of water, the right to use water, the maintenance and development of water resources, and flood control; they were not concerned with pollution control.[1]

Neither the Imperial nor the Weimar governments had authority to enact uniform water management laws at the national level. This field was exclusively within the jurisdiction of the Laender, whose water laws had continuing validity even after 1945.

Shortly after the turn of the century the growth of population and industry with its accompanying pollution caused catastrophic outbreaks of disease in the Ruhr and Emscher river basins. As a result, several special-purpose water management entities were created in the early years of that century for these two river basins: the Emschergenossenschaft, the Ruhrverband, and the Ruhrtalsperrenverein. These were designed to control pollution, build reservoirs and generally to control water supply and quality.

In the ensuing years many other similar, special-purpose water associations were created in other Laender. Their diversity, limited competence, and overlapping jurisdictions, however, caused problems and suggested the need for a more coordinated national approach to water management. In 1937 the National Socialist government, as part of a general policy of centralizing power at the national level, enacted the "Realm Law on Water and Land Association," which applied to all of Germany. The law established a uniform approach to the creation of water associations, and empowered the federal Minister of Nutrition and

Agriculture to standardize the method of formation, structure, and powers of all water associations in Germany. Exempted were eight of the larger and more powerful water associations in the Ruhr region, which had a long history of successful water management and were politically powerful enough to be excepted from the general statute.

After the Second World War, the new 1949 Basic Law reversed the trend toward centralization that had prevailed prior to the war. The Laender were able to reestablish themselves as the primary managers of the water resources within their borders. The movement toward decentralization was reinforced by the allied policy of dividing and decentralizing political and legal power so that Germany would not again pose a major military threat. At present there are over 12,000 water associations in the FRG. With the exception of the eight noted above in the Ruhr district, which deal with water quality and in some cases quantity, most of these associations are small and are concerned with rural and domestic water supply, drainage, irrigation, waterway improvement, and maintenance.

The continued existence and viability of these numerous local water management agencies reflects the continuing strong tradition of local control of water management in the FRG. As we see below, this tradition played a critical role in shaping the debate on the 1976 Federal Water Act and Effluent Charge Law.

4. Political Background of the 1976 Federal Water Act and Effluent Charge Law

By the start of the last decade, environmental quality was badly in need of improvement. Years of rapid industrialization had placed an excess demands on the self-purifying capabilities of receiving waters. In many regions traditional uses of water bodies, for example, as a source of drinking water, had been precluded by the deterioration of water quality. It was apparent to all that existing water quality legislation was inadequate for the task. New water law in particular and new environmental law in general was required.[2] The pressure to improve water quality was both internal and external. Switzerland and the Netherlands, downstream from the FRG, were increasingly concerned about the deterioration of water quality in mutually shared water bodies such as lake Constance and the Rhine.

The heightened concern for environmental quality led to the creation of a Cabinet committee for Environmental Problems to coordinate environmental actions of all federal ministries. In addition to its coordination functions this Committee produced recommendataions that were published in a major policy document entitled, "A Program for the Protection of the Human Environment" (PPHE) published in 1971.[3]

The PPHE came out strongly for a market-oriented approach to environmental control. While it recognized that some standards

and regulations might continue to be necessary, especially for more dangerous substances, it argued that the adoption of an effluent charge concept would decrease the misdirection of resources and the diminution of economic efficiency which result from imposing the cost of waste discharge on the community at large rather than on the producers of the goods or services which cause the discharge. The document also recommended that a constitutional amendment be adopted giving the federal government preemptive power over the Laender to enact appropriate environmental legislation to implement these recommendations. Constitutional amendments to accomplish this purpose were proposed in 1973, 1974, and 1975, but failed to pass. The failure of these amendments did not, however, mean a rejection of the recommendations of the PPHE concerning a market approach to environmental control. It simply meant that the Federal government would have to share legal authority over this subject with the Laender, as required by the 1949 Basic Law.

An earlier and fundamentally important precondition for the support of market economic principles for environmental control was the FRG's remarkable recovery under a market economy during the postwar era. In June, 1948, Ludwig Erhard, then director of Economic Administration in the Adenauer government, had pushed through an economic reform abolishing the pervasive rationing, permits, and price controls that had been in place since the war under the caretaker government (with Allied High Commission approval) and switched virtually overnight from a state-controlled economy to one that depended on the free market for its signals. This policy choice, hotly contested at the time as too risky, released within a few short months the exceptional creative energy of the German people and produced some 30 years of unprecedented economic growth. The success of this policy was so great that it understandably encouraged consideration of market principles for solution of water pollution and other environmental problems.

The recommendations of international organizations also encouraged the FRG to consider application of market principles to control environmental degradation. During the early 1970s the Organization for Economic Cooperation and Development (OECD) and the European Community (EC) were both urging member nations to adopt the polluter-pays principle for environmental control. In 1972 the United Nations-sponsored World Environmental Conference was held in Stockholm, Sweden, and the FRG's Minister of Interior Hans-Dietrich Genscher took a strong stand there in favor of the polluter-pays principle, a position that was supported by two important studies by FRG authors, "The Polluter-Pays Principle and Its Instruments," by Bullinger, Rincke, Oberhauser and Schmidt, and "The politics of the Polluter-Pays Principle," by Rehbinder.[4]

The political support for a market approach for pollution control was so strong during the early 1970s that initial proposals looked very much like the "ideal" systems urged by economists. Charges would be levied on waste dischargers in

direct proportion to the damage caused by their use of public waters.[5] However some of the Laender, especially Bavaria and Baden-Wuerttemberg in the south, opposed such a radical departure from the traditional pollution control system of standards and regulations and insisted on modifications. They initially argued that their water quality control systems, including administrative and compliance procedures, were adequate for the task, and that a charge system was unnecessary. When it became clear that a charge system of some kind was going to be enacted by the Bundestag and Bundesrat, they recommended a more moderate effluent charge system, to operate in tandem with the existing standards/regulatory system.[6] By 1976 the idea of a combined system had become dominant. Such a system would levy charges high enough to give signals to the market, but at the same time would continue an administrative management regime for pollution control.

The idea of a national effluent charge system was strengthened by the existence of the much publicized effluent charge systems in the Ruhr region, e.g., the Ruhrverband and the Emschergenossenschaft. Moreover, the Ruhr systems had provided some technical ideas, for example the "toxicity to fish" criteria as a measure of damage.[7] The basic goal of the Ruhr systems, however, was quite different than that of the proposed national effluent charge system. The goal of the Ruhr systems was to collect money to meet a predetermined budget for the construction and operation of pollution control facilities, whereas the goal of the proposed national system would be to create an incentive for industries and others to reduce their waste discharges into public waters. The collection of a pool of revenues would be only an incidental byproduct of this system. Indeed, one measure of success of the new national system of incentives would be low revenues.[8]

Industry initially opposed the idea of any effluent charge system whatsoever. However as political support for the system gained momentum, this opposition shifted onto implementation issues, such as the criteria for setting charges, the level of charges, and the dates when the system would go into effect.[9]

Some industrialists actually supported the effluent charge concept. The two main sources of industrial enthusiasm for effluent charges were the newer plants that had new waste-saving production processes and the latest pollution control technology and those older plants which had recently installed new pollution control equipment. These companies believed their own charges would be relatively smaller, thus giving them a competitive edge over industrial facilities with less up-to-date equipment. Conversely, a few other industrialists supported the idea because they believed that the levying of charges would even-out the serious inequities caused by variations in the water quality regulatory systems among the Laender.[10]

Four developments illustrate that the new Federal Water Act and Effluent Charge Law reflect compromise, middle ground

resolutions of divergent views. First, instead of a charge replacing a standard, as recommended by some experts in the early 1970s, a charge and a standard was the only serious option.[11]

Second, later proposals were simplified compared to earlier versions. To make the system more workable, simplicity was a major consideration.[12] In the early 1970s biochemical oxygen demand (BOD) was thought to be one criterion on which the charges would be based. BOD, however, is difficult to measure accurately. Some argued too that the BOD criterion was likely to be outdated by the time the law went into effect because by then most water would be subjected to secondary treatment. The consensus about the best criteria to use gradually moved to "BOD plus COD (chemical oxygen demand) divided by two," and ultimately evolved simply to COD. Toxicity to fish became a criterion partly because of its long usage by the Ruhr water agencies. The adoption of the cadmium and mercury criteria was influenced by international concern, especially from the Netherlands, because waters polluted with these metals then flowed from the FRG into or through other countries.[13]

Third, in 1981 the charge was established at an initial level of 12 DM although a panel of experts recommended a charge of 80-100 DM in 1974, a 1972 federal government draft proposed a 40 DM charge, and industry and municipalities asked for no charge or one under 20 DM in the early 1970s. Pressure from the industrial sector, and from some of the Laender which felt they needed more time to develop implementation programs, led to a slow progression of the rate from 12 DM per damage unit to 40 DM by 1986.

Between the March and April final versions of the draft laws, the charge schedule was halved again, provided the federal standards were met. This result reportedly emerged as a compromise between the Federal Ministry of Interior, which wanted a 100 percent charge, and representatives from municipalities and industries, which wanted no charge if the minimum was achieved.[14] The evolution of the charge, not surprisingly, was toward a compromise solution.

Fourth, the federal government failed to obtain the full competence to manage water quality, and explicit goals in the federal government's draft law in 1972 were excised in the 1976 Federal Water Act. The Laender retain their power to determine the uses and consequent quality of a river (with due regard for the need to maintain friendship with bordering countries by exporting acceptable quality water in international rivers). Noteworthy also, in the federal draft of March 21, is the amputation of paragraphs by the Bundestag, which, in effect, decreased potential federal power and retained more power in the Laender. As a further sign of Laender importance, the Laender were allowed to determine how the effluent charge revenues are to be spent. Earlier drafts gave the dischargers an explicit voice in revenue allocation. Now they may be included in revenue allocation decisions at the discretion of the Laender.

5. The 1976 Federal Water Act

The 1976 Federal Water Act (FWA) sets forth the conditions governing the granting of permits to use public waters for the discharge of effluents. The federal government is empowered to establish uniform discharge standards for certain major pollutants and can determine the level of technology that must be achieved by municipalities and industries.

The federal government has authority under the Act to establish a minimum national water quality goal for receiving waters, and did so by setting this goal at quality level II (Guetezustand II).[15] Quality level II is moderately polluted water with a good oxygen supply which is capable of supporting a large variety of algae, crayfish and insect larvae, and capable of supporting a fishery.[16]

The Act continues the operation of the permit systems that were in effect in the Laender under the 1957 law.[17] Effluent discharge permits can be refused, limited or conditioned. Existing permits may also be modified to make room for new or additional discharges by others.[18]

The FWA made an important change in existing law by banning future issuance of any "licenses" by the Laender.[19] Licenses, which were used extensively by some Laender, created vested rights for 20 years or longer and required compensation when revoked. Now all waste dischargers must operate under permits, which are for shorter periods of time and are subject to change and even revocation as water quality demands change over time.[20] Under the FWA even present license holders are subjected to reasonable regulations to conform with the licensed discharges with the federal minimum standards under Art. 7a(2). More important, license holders are also subject to the same charges under the Effluent Charge Law as permit holders.[21]

While the federal government establishes the overall national water quality level (i.e., Level II) the Laender establish definite water quality targets, and programs for achieving those targets. The Laender draw up three types of plans for the management of water, including estuaries. "General water plans" provide the framework for water management, describing present conditions and projecting future possibilities for the region. "Use plans" are essentially ambient water quality standards; they describe the anticipated uses of the water and the quality that must be achieved to permit those uses.[22] "Waste disposal plans" establish a waste discharge program designed to permit achievement of the ambient water quality standards and form the basis of the issuance of permits by the Laender.[23]

None of the plans, classifications of waters, or permits is permanent or creates vested rights. All are subject to change as conditions change over time.[24]

The most important provision in the FWA is Art. 7(a) which authorizes the federal government to establish technology-based standards (allgemein anerkannte Regeln der Technik) such as best practicable, or commonly accepted technology. These standards form one of the basic measurements used in the Effluent Charge Law (ECL), discussed later. The standards vary depending on whether the waste water originates with a municipality or industry, and if the latter, the standards vary by industry. The federal government has appointed some 50 task forces to establish these technological standards for different industries and for cities.

The FWA provides for the appointment of water protection agents to assist in enforcement of the minimum standards. Large water users must designate such water agents within their own organizations to monitor waste discharges. The Laender are also empowered to require the appointment of such agents in other circumstances when this is expedient.

In addition to the basic regulatory system provided for in the FWA, the law provides that dischargers causing harm or injury to others are liable for damages.[25] Those who violate the provisions of the Act are also liable for fines of as much as 100,000 DM.[26]

6. The Effluent Charge Law

After years of extensive public discussion the Effluent Charge Law (ECL) was overwhelmingly passed in the Bundestag and Bundesrat in September 1976.[27] It calls for the Laender to levy charges (Article 1) on direct dischargers of specified effluents into public waters--fresh, brackish and saltwater. Attention in this study is limited to fresh water because it is the focal point of the law in practice.[28] Firms and households discharging into municipal sewerage facilities are not charged directly.[29] The effluent charge policy is designed to reflect the polluter-pays principle, which broadly states that the parties discharging waste should pay for the abatement costs actually or implicitly imposed on society.

The charge system is also designed to be compatible with the principle of precaution or prevention, which states that the quality of natural systems such as rivers ought not to be permitted to deteriorate and should improve through time.[30]

The third principle reflected in the ECL is one of cooperation. Environmental policy can be successful with close cooperation among the federal government, Laender, communities and citizens.[31]

The discharge permit issued by the Laender to all direct dischargers is divided into two parts. The first, a legal part, establishes the discharge right,[32] and contains all the physical, chemical and biological data and monitoring procedures pertaining

to waste water quality (pH, temperature, biochemical oxygen demand (BOD_5), other concentrations, etc.) and the maximum amount of waste water in specified periods (hour, day, year). The specified waste water quality levels must be equal or higher in quality than the miminum requirements of the federal administrative regulation. This part of the discharge permit is subject to the water laws of the FRG and the Laender.

The second part of the discharge permit contains all the data that are necessary to calculate the waste water discharge bill.[33] The pollutants considered for purposes of the effluent charge are settleable solids, chemical oxygen demand (COD), cadmium (Cd), mercury (Hg) and toxicity for fish. Also specified is the annual volume of water. The standard may be specified in terms of concentration per m^3 of discharge volume or per ton of product produced.

The permit specified a maximum concentration of each pollutant and volume of waste water a discharger expects to produce (Hoechstwert). The average (standard) amount and concentrations expected to be discharged are also specified (Regelwert) and are provided by the waste dischargers. Under normal circumstances, the figure or reference value (Bezugswert) on which the charge is based is the volume and concentration the entity expects to discharge. Notice that the charge normally is based on the expected rather than the actual level of discharge. This permits economy in administration.

Table 1 illustrates these ideas. The figurative firm discharges only settleable solids and COD whose reference (expected average) and maximum values have been specified. Under normal circumstances, the waste discharge bill is easily calculated. The data in Table 1 are converted to damage units using the coefficients provided in an appendix to the ECL and exhibited in Table 2 below.[34]

The total damage units of pollution, based on the data in Table 1 and the conversion factors in Table 2, are summarized as follows:[35]

	Damage Units (DU)
Settleable Solids	1,600
COD	165,600
	167,200

The charge per damage unit was 12 DM in 1981 and rises to 40 DM per damage unit in 1986.[36] Thus the initial bill for this representative firm in 1981 is 2,006,400 DM (about 803,000 dollars).

DM is about $.40 in round numbers, as of March 1983.

TABLE 1
SELECTED POLLUTION PARAMETER VALUES
FOR A HYPOTHETICAL FIRM

	WATER LAW Component Values	WATER CHARGE Component Values
Total Discharge (m^3/Yr)	12,000,000	10,755,000
Specific Amount of Waste Water Per Ton of Product (m^3/Ton)	190	160
Settleable Substances (ml/l)	.18	.15(Ref.Val.) .30(Max.Val.)
COD (KgO_2/Ton of Product, and	140	112(Ref.Val.)
CPD (KgO_2/l)	740	700(Max.Val.)

The ECL contains an economic incentive for polluters to meet the federal minimum standards. Under Article 9(5) of the ECL, dischargers in compliance with the federal minimum standards will have the charge liability halved by the unit charge. In the event that the Laender have imposed stricter standards than those set by the federal government, the standard of the Laender must be met in order to qualify for the 50 percent discount. The incentive to comply created by introducing a discontinuity or jump in the payment schedule has some special characteristics which will be discussed in a later section of this paper.

TABLE 2
CRITERIA TO BE USED FOR ASSESSMENT OF DAMAGE OF DISCHARGES, NATIONAL EFFLUENT CHARGE SYSTEM OF THE FEDERAL REPUBLIC OF GERMANY

Criteria	Unit of Measurement, Quantity/Yr.	Damage Units Per Unit of Measurement
Settleable Substances for Which Organic Content >10%[a]	1 m^3 settled	1.0
Settleable Substance for Which Organic Content <10%	1 m^3 settled	0.1[a]
Oxidizable Substance, as Measured by COD[b]	100Kg	2.2
Mercury & Compounds[c]	100g Hg	5.0
Cadmium & Compounds[c]	100g Cd	1.0
Toxicity Toward Fish	$1000m^3$ wastewater $0.3G_F$[d]	

a. Measurement procedure: reduce amount by 0.1 ml/l wastewater beforehand.
b. Measurement procedure: reduce amount by 16 mg/l wastewater beforehand. Silver sulfate is the catalyst in the dichromate method specified.
c. Measurement procedure for Hg and Cd: atomic absorption spectrometer.
d. GF is the dilution factor, e.g., down or up to nontoxicity. If wastewater is discharged in coastal waters, toxicity is not considered for those substances whose content is based on salts which are comparable to those in ocean water.

It generally may be presumed that the normal (expected) value will not exceed the federal minimum standard.[37] In the example above, the bill would be halved to 1,003,200 DM (about 402,000 dollars) if the firm met the federal minimum.

If actual waste discharge is above the federal minimum, using the average (monitor value) of the last five observations, the polluter faces legal consequences under the FWA and loses the 50 percent reduction in the charge obligation.[38]

The ECL and FWA are primarily keyed to expected performance. However, seasonal and other variations in discharge are an important consideration. Damage generally is a function of actual, not average discharge. In recognition of this, maximum concentration values and volume are defined and the maximum cannot be more than twice the expected values stipulated by the discharger. It follows that the physical basis for the charge is at least one-half the maximum value.

If the maximum value is exceeded more than once, then the value on which the charge typically is computed (Regelwert) is increased. The revised basis for the charge increases with the amount the maximum actually is exceeded in a mannmer specified in the ECL.[39]

The basis for computing the charge is reduced if the discharger anticipates that his actual volume and concentration will be below his previously stipulated expected value (or standard value) by at least 25 percent for at least one-fourth of a year.[40] In this case, the charge is based either on the actual performance or on the downward revised expected value.

The effluent charge system is a delicate and complicated resolution of federalism and practicality. The discriminating reader will have detected unexplained possibilities in the above description. For example, what is the charge if the discharger's actual pollution meets the federal minimum but is above the expected level? We cannot give a general answer for the following reason. If the discharger, in fact, meets the federal minimum, then the federal conditions are met. That the polluter is actually discharging more than is expected but is only paying on the basis of the lower, expected value, is a potential issue for the Laender to resolve as each sees fit. Perhaps the answer is provided in Articles 14 and 15 of the FWA which prohibit acts of evasion. Only a state-by-state survey would provide the answer to these and other subtle matters which fall within the Laender jurisdictions.

6.1 The Hardship Clause

The ECL contains a hardship clause[41] that allows the federal government, with consent of the Bundesrat, to pass laws exempting industries, sections of industries, or regions from the charge in instances where imposition of the effluent charge would result in significant detrimental economic conditions. An exemption may be

for the whole charge or a part of it, but it is in any event not to remain in force later than December 31, 1989.

The Minister of the Interior to date has been petitioned by eleven industries for exemptions. The requests have come from pectin, cellophane, particle board, yeast and non-ferrous metals industries. Seven petitions have been denied and the rest are still being considered. Several counties (Kreise) in East Bavaria and a number of cities have also requested exemptions. They have been rejected either because of inapplicability of the law to the counties or because of lack of sufficient proof that imposition of the charge would occasion significant detrimental economic consequences to the cities or counties.[42] Although the hardship clause has yet to be used, it was thought by many interviewed to have been an important element in the political process leading to the enactment of the legislation. Criteria for assessing hardship are not spelled out in the Act.

6.2 Magnitude of the Charge and the Minimum Standard

a) Industries

Because no revenues have been collected and too little time has elapsed to make a representative study of actual impacts, it is not possible to report the actual economic effect of the new water quality laws on municipalities and industries. However, one study does provide some estimates of the magnitude of the charge in value terms. Rincke appraised the impact of an effluent charge on 26 of the major water polluting industries in the country. He found that the cost of the charge and avoidance measures were less than two percent of sales for the most serious polluters except in the pulp, yeast and leather industrial branches.[43] Sales for the last two industries rank in the lowest twenty percent of the group surveyed. Only in the pulp sector does the charge component loom large. Several of those interviewed stated that the pulp industry has many marginally economic plants, barely surviving with outdated technology. Should the new water quality laws put some of the pulp plants out of business, it would be seen as a modest advancement of the anticipated date of demise. Short of a full-scale study of each sector's domestic and international competitive position, one cannot say that a one or two percent increase in the cost of products is altogether innocuous. However, it is clear that such an increase is small compared to variations in advertising budgets and annual changes in interest and wage rates, and probably is small compared to annual changes in raw material costs.

b) Municipalities

The charge for waste treatment to municipalities depends on the size of the municipality, desired level of waste treatment and the age of equipment. It is high when new facilities are built and tapers off as the financing obligations are met, since the charge varies with financial costs rather than real costs.

One study found that sewerage charge rates varied from .60 DM/m^3 to 3 DM/m^3, but that the charge in large municipalities did not exceed 1 DM/m^3.[44]

The effluent charge component of the new laws is expected to increase the unit cost by .03 DM/m^3 in 1981 and by .11 DM/m^3 in 1986. The effluent charge component in 1986 will amount to about 3.26 DM or $1.30 per year per inhabitant.[45] The cost of adding facilities to meet the minimum standards expressed on a volume basis was estimated to be about .33 DM/m^3 for the municipalities surveyed or perhaps 10 DM ($4.00) per year if per capita annual consumption is 30m^3. Putting the cost of the charge (about $1.30) and the necessary new facilities (about $4.00) together, yields an estimated cost of under about $6 per year per inhabitant to meet the requirements of the new water quality laws.

7. Task Force Groups to Establish Minimum Requirements

Before proceeding to a more detailed analysis of the new waste water laws, it is useful to sketch how the minimum requirements in the laws are established.

The Federal Ministry of Interior initially established 60 task forces in 1977, one for each major polluting activity. Since then there has been some consolidation so that about 47 task force groups remain (see Appendix A). The purpose of the task forces, set forth in the common set of instructions, was to establish minimum standards compatible with generally accepted standards of technology.[46]. Volumes and concentrations regularly issued with new effluent discharge permits and standards, acceptable to a majority of experts in the field, describe the minimum standard level desired. Table 3 illustrates the standards for municipalities of three different sizes.[47]

Membership of the task forces was appointed by the Minister of Interior and was drawn from the federal and Laender governments and from representatives of the relevant industries.[48] Technical expertise was brought in from universities, technical institutes and consulting firms. Those from the consulting firms tended to be guests in an advisory role, invited by the Chairman. The size of the task forces varied. Generally there were four regular members with greater variation in the number of advisory experts.

TABLE 3

FEDERAL MINIMUM STANDARDS FOR MUNICIPALITIES

Samples According To Load Category of Discharger	Settleable Solids ml/l	Chemical Oxygen Demand(COD) mg/l	Biochemical Oxygen Demand After 5 days (BOD_5) mg/l
Load Cat. 1: Less than 60kg/d BOD_5 (untreated)			
Grab Sample	0.3	--	--
2-Hr.Mixed Sample	--	180	45
24-Hr.Mixed Sample	--	120	30
Load Cat. 2: 60-600g/d BOD_5 (Untreated)			
Grab Sample	0.3	--	--
2-Hr.Mixed Xample	--	160	35
24-Hr.Mixed Samp.	--	110	25
Load Cat. 3: More than 600kg/d BOD_5 (Untreated)			
Grab Sample	0.3	--	--
2-Hr.Mixed Sample	--	140	30
24-Hr.Mixed Sample	--	100	20

The idea of a task force to establish minimum standards and the composition of that task force are crucial ingredients in the enactment of the new laws in the FRG and in their implementation. They are vital considerations in the adoption of an effluent charge policy in the United States. The Laender, by voting for the new FWA, gave up their control to set minimum water quality standards before they knew what the new minimum effluent standards were. Basically they were being asked to give up an unspecified amount of power.[49]

An effective safeguard against the loss of too much control was to provide a role for the Laender and the polluters in the standard-setting process. The task force was the institutional vehicle for this protection. However strong the appetite for improving water quality of Ministry of Interior, the appointment process had to recognize the bare fact that each state had to enact implementing legislation and carry out the attendant enforcement responsibilities. Moreover, the Bundesrat had to pass the regulations recommended by each task force. The task force was a practical idea for postponing debate over technical minutia which would have mired the legislative process and

extended the date of enactment further into the future.

At the present time, 39 task forces have submitted regulations, of which 27 have been or are about to be ratified by the federal government and the Bundesrat. It is expected that most of the remaining regulations will be completed by the end of 1983.[50] Task forces for some of the major sources of pollution, however, have yet to submit regulations.

8. The Polluter-Pays Principle and Effluent Charges

A first step in evaluating the actual effluent charge system is to consider the characteristics of an ideally efficient system. Then it readily will be seen that the actual effluent charge system bears little resemblance to an idealized one. That is not a surprising finding. It does mean, however, that the search for merit and deficiencies must be made in the murky realm of second-best analysis, where judgment and partial analysis play a more prominent role than rigorous proofs in a general equilibrium context.

There is a menu of policies which induce individuals, firms, municipalities and public agencies to use water quantity and water quality in a manner which serves the public good. Two broad sets of regulations are available and reflect different philosophies in practice. The first has a physical orientation and is manifest in permits or licenses. Physical constraints are imposed on water use: withdrawal cannot exceed a given number of liters per period; discharge cannot exceed a given amount of a named chemical substance during a specified period.

The second approach, effluent charges, has a strong economic component. Those using public water bodies as a waste receptor are charged a rate expressed in money (DM) per physical unit of waste discharged. Unlike the standards system, the polluter is not constrained by physical rules. His constraint is a more subtle, economic one. He can pollute as long as he can afford to pay the price: presumably until the profit from additional sales no longer matches the cost of paying for the residuals associated with the additional sales.

There are no significant differences between an idealized effluent charge system and an idealized standards system. For each, public managers, blessed with adequate information, calculate just that level of water quality in a river for which the benefits of extra quality are matched by the cost society necessarily must bear to preserve that extra quality.[51]

Discovering this magic point (or vector with multiple qualitative characteristics) requires enough knowledge to permit the rulemaker to calculate what each polluter would be willing to pay to discharge an extra unit of waste.

The water quality manager can achieve the desired outcome either by posting a common effluent charge, which each must pay

in order to consume an extra unit of pollution, or by issuing individual (optimum) standards to each "consumer" of water quality. The charges or the standards change through time in keeping with changing circumstances.

Although the idealized system is of little practical interest, its attributes have considerable merit. First, under these circumstances each polluter places the same value on an extra unit of pollution. Equally, this means that no discharger pays any more than another for an additional unit of effluent discharge. The cost is equal across polluters. Veiled behind the single characterization, yet nevertheless of crucial significance, is the second attribute. There is no cheaper way to achieve the desired quality level because the least cost technology has been adopted by all. Those who can treat cheaply will trade this service for a price to others whose cost of treatment is high. Of course, the incentive to discover low cost measures to reduce effluent discharge diminishes as the level of the effluent charge decreases.[52]

The third attribute is less important for the present study. Under ideal circumstances, the cost to dischargers of treating a bit more is just matched by the benefits to those from marginally improved water quality. If this condition is not met, there is economic waste. A charge or standard set too high results in polluters paying more than the beneficiaries gain from the last bit of water quality achieved. For many reasons, not the least of which is the difficulty of measuring the benefits of water quality improvement, no one seriously has argued that the federal minimum requirements or effluent charges in the FRG will result in this condition. When the three conditions described above are met, there are no further gains from trade among polluters, among beneficiaries or between polluters and beneficiaries of clean water.[53]

These three attributes fall within the realm of efficiency. In addition, when an effluent charge is adopted, it satisfies the equity criterion known as the beneficiaries-pay principle in public finance and the polluter-pays principle in the case of water quality. Those who pollute are those who pay. Standards fall short of this equity goal because they permit the free discharge of a given amount of pollution.

The Effluent Charge Law (ECL) and the Federal Water Act (FWA) at the federal level did not satisfy the efficiency criteria set for the above ideals because each producer of a given product faces the same minimum standard and each must meet the same discharge concentration levels whether the cost of treatment is high or low. Not even by paying a charge can the uniform minimum standard be avoided.

The marginal cost of treatment in one branch of industry is not equal to the marginal cost in another, except fortuitously, because the task force groups were not charged with that responsibility.

In the next two sections we discuss the degree to which a policy of minimum standards leads to resource inefficiency in the municipal and industrial sectors.

9. Uniform Standards are Costly Unless Required Waste Treatment Levels are High

For as long as economists have been discussing the charges or standards approach to environmental quality management they have argued strenuously that uniform standards are inefficient. A uniform standard refers to a policy in which all dischargers of a type, such as municipalities, are required to achieve the same level of purification or waste removal or to adopt the same technology.

Whatever its practical or equitable merits, the policy is costly and inefficient whenever individual waste dischargers differ in ways substantially effecting the cost of waste treatment. (For example, the per capita cost of municipal waste treatment falls dramatically as the number of inhabitants served rises (see Figure 2).[54]) When the same level of purification is imposed on all entities, the smaller municipalities pay more than the larger ones to treat the last units of waste. Therefore, the same water quality level can be achieved at a lower cost by cutting back on the high cost activity and expanding the lost cost activity.

According to the Council of Experts for Environmental Questions, the effluent charge policy is about one-third cheaper than a uniform standards policy.[55] A charge level of 40 DM (1974 prices) would have achieved a 73 percent removal for a cost of 1.2 billion DM per year, whereas a uniform standard achieving the same level of purification would have cost just under 1.8 billion DM per year.[56]

Inflation and technical progress have occurred since 1974 when these data were assembled. Increasing the DM values by 50 percent or more would produce estimates more appropriate for the present. By 1986, it is expected that the real value of the 40 Dm charge will be around 22 DM.[57] It would be over 80 DM per damage unit if the charge was indexed for inflation.

The potential economic advantages of an effluent charge over a uniform standard apply to the industrial sector as well. Using the data from one important and widely quoted study, at a uniform standard of 80 percent removal of chemical oxygen demand, some pollution-intensive industries such as chemicals have (marginal) treatment costs more than twice as high as other pollution-intensive industries such as food processing.[58] The potential advantage of the charge over a uniform standard is pronounced for large, newer, pollution-intensive firms which typically have low unit treatment costs.

It is fairly obvious that potential costs savings from eschewing uniform standards policies are greatest when there is a

big difference in treatment cost opportunities among polluters. As required levels of treatment or the effluent charge increase, opportunities for substituting low cost for high cost treatment diminish and the economic advantage of the effluent charge over uniform standards is eroded.[59] A charge high enough to achieve 100 percent removal for all is the same as a uniform standard. At the required levels of purification cited above, the efficiency gains of a charge over a uniform standard are modest.[60]

10. Low Effluent Charge Levels Reduce but Do Not Eliminate Incentives to Economize

It is a common belief in the Federal Republic of Germany,(FRG) among professionals in the area of water quality affiliated with universities and the federal government, that a charge of 12 DM in 1981 rising to 40 DM per damage unit is too small. Such a charge cannot, by itself, achieve the desired water quality objectives for the country and it cannot be a very great incentive to discover low cost abatement strategies. Research results reported in Appendix B support the federal proposition. But there are important exceptions worth citing even if the frequency is unknown.

In response to the new water quality legislation, the giant chemical firm, BASF, with a complex involving hundreds of small plants and over 50,000 workers at one site in Ludwigshaven, has made a serious effort to manage water quality. Its staff for these matters has increased markedly in the last decade, nearly doubling since the passage of the water quality legislation in 1976.[61] Not only is BASF responsible for treating its own waste but it treats the waste of two large municipalities and three smaller ones with populations of over 300,000 as well, thereby achieving low unit abatement costs by large-scale integrated treatment processes.

BASF is required to achieve a purification level of 88 percent in terms of COD, but their plants actually achieved an 84 and 96 percent removal of COD and BOD_5 in 1981. Taking pretreatment into account, removal levels were around 80 percent for COD and over 94 percent for BOD_5 in the late 1970s.[62] Presumably BASF achieves these high levels of treatment because it is cheaper than paying the effluent charge. We have learned on an informal basis that there are numerous other large industries with comparable performance records.

The second feature of the BASF system is of substantial economic interest. BASF has practiced the polluter-pays principle within its plant since 1975.[63] Individual branches basically face shadow or implicit prices for the volume and concentration of COD. The response to the introduction of an internal liability system has been a 20 percent decrease in discharge. Rather than mandate physical decreases, the intra-firm charge elicited a "voluntary" decrease in effluent discharge achieved through process change, recycling of solvents,

improved pretreatment facilities (separation tanks, settling pits, etc.) and replacement of old facilities.[64] It is fair to conclude that even if the charge is modest, by some standards, it induces cost savings.

The charge also provides an incentive for municipalities and industries to operate treatment plants and operate them efficiently. Inefficient treatment is incompatible with minimum requirements and inefficient operation will prevent qualification for the 50 percent discount on the effluent charge. The charge, by encouraging increased operating and maintenance expenditures, partially offsets the efficiency distortion existing subsidy programs create because only capital costs are subsidized.

One consequence of the ECL (and the FWA) is the remarkable level of investment in waste treatment plants and equipment and related operation and maintenance expenses it occasioned during the announcement phase, generally, 1974-1979. Several studies have documented this response, the most recent being that by Sprenger and Pupeter.[65] In Sprenger and Pupeter's survey of 54 waste water intensive representative industries, they found that about 10 percent met the expected minimum effluent standards requirements at the time the laws were passed in 1976. These industries' incentive to make subsequent investments arose from the potential extra benefits of paying one-half the charge rate for a reduction in expected residual pollution discharges achieved. Another 70 percent made investments in order to satisfy the minimum requirements in the new federal water law and the effluent charge law.

Sprenger and Pupeter further concluded from the interviews that some significantly accelerated investment can be attributed to the effluent charge part of the laws alone. Some of those interviewed did not have to meet the restrictions set down in new legal permits because this would have preempted their old licenses. They were, however, subject to the Water Charge Law (ECL). Since these firms did not behave dramatically differently from those subject to both the FWA and the ECL, it is clear that the effluent charge law did provide an incentive to abate pollution.

Whereas Sprenger and Pupeter studied industrial responses to the new water laws, Ewringmann, et al., investigated the response to the new laws by municipalities.[66] Ewringmann, et al., found that slightly more than one-third of the towns or cities interviewed cited the effluent charge law as the primary reason for undertaking more extensive waste treatment measures, while an additional 14 percent declared that the minimum requirements alone were responsible for increased expenditures. Another 20 percent stated that they had accelerated their construction plans due to the effluent charge law.

The authors of this study concluded that when the planned construction phase of their sample municipalities is completed, 80 percent of the inhabitants will receive full secondary

treatment. This is compared to a national goal established in 1971, of 90 percent in 1985 and estimated levels of under 40 percent and 53 percent in 1963 and 1978 respectively.[67] Some, including Wicke and Dorau believe the investment stimulus provided through the announcement of the new laws was one of the most favorable effects.[68]

We have tried to demonstrate that the adopted effluent charge policy alone and in consort with the new minimum standards, induced firms and municipalities to invest in new waste treatment plants and equipment and created some incentive to find economical ways to reduce waste discharge. As a result of dedicated efforts to manage waste discharge more efficiently in 1981, more than one-half the waste dischargers met the minimum requirements and qualified for the halving of the charge in general and in Baden-Wuerttemberg, 90 percent qualified for the charge reduction.[69]

The result necessarily improved ambient water quality. No quantitative estimate of the change in water quality has been made but the Umweltbundesamt (EPA) reports there has been an improvement in the biological quality. This conclusion appears to be true, judging from a comparison of water quality maps between 1975-1980,[70] where river segments are classified by four classes of water quality.

Other actual or likely consequences, some of them good and others not beneficial, will be discussed below. The subsequent evaluation is largely qualitative because the laws are so new. There has been too little time to have practical experience with administering or enforcing the law or spending the revenues collected.

11. Effluent Charge Revenues: A Potential Substitute Source of Subsidies

The effluent charge will collect revenue amounting to about 350 million DM in 1981.[71] The actual amount of revenues is not yet known since the money need not be collected until the end of 1982. There is a distinct variation in amounts collected among the Laender. For example, North-Rhine Westphalia estimates revenues of 100 million DM while Baden-Wuerttemberg estimates revenues of around 15 million DM in 1981.[72]

Revenues are to be used for water quality management administration expenses associated with the ECL,[73] and also for projects or purposes which maintain or improve water quality, including industrial production processes which are pollution-saving.[74] The fraction devoted to administration varies among the Laender. It was as much as about 50 percent in one Land in the first year, but is expected to fall to 20 to 25 percent in future years.[75]

Perhaps because no revenues have been collected, those interviewed were unaware of any specific criteria for revenue expenditures adopted by the Laender. Several experts speculated that the revenues would be made available to subsidize investments which improve water quality beyond the federal minimum standards, for example, tertiary treatment, as well as to support investments which bring water quality up to the minimum standards. Another person thought that loans with subsidized interest rates would be available.

Effluent charge revenues are an obvious and important source of subsidies for waste treatment investments. This inevitably raises concern that the new source of subsidy may be substituted for the old source, general fund moneys.[76] At the present time, Laender governments offer investment subsidies in the neighborhood of 40 percent or more.[77]

It takes little political acuity to imagine that the Laender governments will decrease subsidies for waste treatment from the general fund once effluent charge revenues roll in. This would be a particularly attractive substitution in times of budget stringency. The polluter-pays principle can be invoked in defense of the reallocation. It will be hard to argue against the proposition that the dischargers who benefit from waste treatment facilities (which meet the minimum standards or reduce the bill for discharge) ought to pay for the facilities. Those who approve of shifting fiscal responsibilities from higher to lower echelons in the political hierarchy can see the merit of the effluent charge as a new source of subsidies.

12. More Policy Instruments are Better Than Less

Some have argued that an effluent charge is a more flexible policy tool because it can be changed more readily than an effluent standard.[78] Others have argued just the opposite. For

example, Baumol and Oates state that "one serious practical liability" of the effluent charge is the inability to change it as quickly as may be desired[79] The truth probably rests between the two extremes. Standards can be altered more easily in some cases, effluent charges in others, depending largely on the concatenations of public and private expectations.

The benefit of having a system of both standards and charges is that the water quality regulations can each be adjusted through time to produce a result more harmonious with the desired water quality objectives. The objectives will change through time as a result of changing environmental and economic conditions. The added flexibility provided by multiple regulatory instruments is not merely of theoretical interest; it is an argument made by a number of experts interviewed, and it is a point to be made in favor of adopting a charge policy in the United States.[80]

A combined charge and standards system is advantageous in a decentralized decisionmaking framework where the control from above is circumscribed. A critical case in point is the limited ability of the Laender to regulate the municipalities. Laender can regulate the aggregate discharge level of a municipality but they are powerless to establish charges from the firms and households which indirectly would achieve this discharge level.

The Laender charge the municipalities for their waste discharge. The Laender cannot force municipalities to adopt pricing policies for water quantity or quality which make the indirect dischargers, the customers of the municipalities, see the marginal economic consequences of their waste discharge decisions. However, introducing an effluent charge typically increases the costs of a continued average or nonmarginal pricing policy for all customers. Customers who are not the cause of the increased price, because they do not pollute or their pollution is more benign, now have an economic incentive to pressure the municipality to adopt a more rational charge policy.

To illustrate, a municipality which practices average cost pricing of fresh water (the price covers water quality costs as well) or waste discharge on a volume basis will charge the same price to two withdrawers of the same quantity. However, one may use the water for cooling and not change water quality, as measured by the quality parameters on which the charge is based. The other may discharge high concentrations of chargeable pollutants into the municipal system. The effluent charge imposed on the municipality by the Laender simply increases the municipalities average cost of water services, which is passed on to the firm using water only for cooling. We can expect this firm to press for a municipal pricing policy which is better tailored to the costs a firm has created. The likelihood increases as the perceived inequity rises; i.e., as the charge level to the non-residuals discharger increases or as the variance of pollution load across indirect dischargers increases.

Evidence of the inducement to change customer pricing policies created by the effluent charge is provided in a survey of 52 municipalities. Nearly one-fourth of the municipalities had decided to change the structure of their water and sewerage fees in response to the effluent charge prior to the policy actually going into effect.[81] More can be expected to change their fee structure with time.

There is a further advantage of a combined charge and standard regime in a decentralized system. It is difficult for an authority like the state to use an effluent charge alone to achieve a desired ambient water quality when the state has no control over the pricing policy of municipalities or other public agencies with their own pricing policies.

The state could set forth optimal solutions to achieve the desired outcome either by using its best estimate of the pricing policy the municipality will adopt, or by issuing to the municipality charge systems contingent on the pricing policy the municipality adopts. These are unlikely to be realistic possibilities. More plausible are standards set to achieve whatever quality goals are desired by the state combined with a charge system which satisfies non-water quality efficiency criteria such as equity considerations. These considerations are important and in all likelihood are reflected in the standards as well.

13. Effluent Charges Change the Costs of Enforcement

There is no reason why enforcement costs should be different with an ideal effluent charge compared to an ideal standard. Of more practical interest is whether actual effluent charges will reduce compliance costs in the United States. We must speculate about the answers in both cases since it is too soon to obtain qualitative or quantitative evidence on the new German program.[82]

In the absence of an effluent charge, the reward for violating a standard is the expected gross profit of the actions less the expected costs associated with being caught.[83] If it is reasonable to assume that in a combined charge and standard system those caught accidentally or intentionally exceeding the legal standard would have to pay fines plus charges which vary with the unreported quantities discharged, then the charge system reduces the expected net benefit of violating the standard. Thus, a given level of compliance can be achieved at a lower enforcement cost in the presence of a charge. Alternatively, a higher level of compliance can be achieved (with a standard and charge) than was obtained at the old cost of enforcement, when there only was a standard. In short, non-compliance should decrease when it is less rewarding, so enforcement can be cut back accordingly.

Enforcement costs also will be lower if there is some trade-off between "justice" and economic sanctions in the world of practical affairs. Polluters might successfully argue that

because they are paying, the frequency of punitive proceedings or level of punishment should be mitigated. This argument is unavailable in a pure standards system.

The above arguments for decreased enforcement costs focus on the (net) benefits of evasion to the evader. The outcome when viewed from the supply side is different. Prior to an effluent charge, the reward to the Laender water quality management authority for enforcing water quality standards is improved water quality. Since effluent charge revenues cover the Laender's costs of administering the effluent charge law, the water quality management agencies in the Laender will be encouraged to increase enforcement activities. The rewards are improved water quality and a larger agency, with the expansion automatically financed by effluent charge revenues. The net result of these qualitative arguments is: (1) There will be a greater resemblance of actual discharge to legally mandated standards. In this sense one can say that the quality of water law has improved. (2) The reduction in the discrepancy between the actual result and the legal requirement, in effect, reduces the uncertainty about enforcement to polluters. (3) The cost of a given level of compliance has decreased but it is not possible to conclude that total enforcement costs will increase or decrease unless the agency aggrandizement effect can be assumed to outweigh the diminished value of compliance averting behavior for firms and municipalities.

The new legal and economic instruments are more precisely stated than heretofore and have induced a more precise measurement and monitoring system. The Laender have been forced to sharpen their enforcement practices.[84] The increased quality of data removes ambiguity. This increases or reduces the costs of enforcement depending on the quality of administration prior to the new laws. Compliance with permits formerly was more of a qualitative judgment based on a spectrum of considerations.[85] Such judgments are more likely to be accurate in Laender known for their tradition of high quality administration.

In contrast, the new charge system places high stakes on limited pieces of quantitative information such as the levels of the five pollutants on which the charge is levied. If, for example, the minimum requirement is barely exceeded, the bill doubles because firms and municipalities do not qualify for the half-price incentive for meeting the minimums. The difference could amount to as much as 4 million DM for some in 1981.[86] During discussion it was argued by one interviewee that this feature of the charge policy is likely to invite more litigation, thereby increasing the cost of the system. Others may see the feature as an inducement to stay within the minimums. Enforcement is one element of the broader issue of implementing the charge system to which we now turn.

14. The Costs of Institutional Change

14.1 Federal Level

Peter Menke-Glueckert has argued that the formation of successful environmental policy in general, and the effluent charge law in particular, is, in three ways, a test case of the FRG's political culture and democratic system.[87] First, the physical dynamics of the environment introduce intertemporal complexity by requiring decisions and plans extending beyond the normal four-year election terms. Second, environmental problem-solving strategies must be compatible with the political response and legal competence distributed among international, federal, Laender and municipal entities. Finally, success requires an understanding of complex technical and economic problems. An effluent charge is still a difficult concept to master in political circles and in engineering and scientific bureaus.

The effluent charge system was not a part of the very long tradition of usage licensing practices of German water administrative authorities. Menke-Glueckert, and others, also have emphasized how painfully long it took to nurture the idea of an effluent charge to maturity in the parliament.[88] It is one thing to change the conditions of permits; there is the old 1957 law and a specific system of water quality licenses and permits which date back to the last part of the 18th century.[89]

The idea of a nationwide effluent charge was a dramatically new idea. Integrating it with standards and permits made it a complex undertaking. It required education of legislators, Laender officials, and municipal and industrial administrators. Real costs were incurred to bring the charge system to fruition at the federal level. Although the effluent charge system is a simple concept to understand, and the computation of the charge is easily described in a few paragraphs, a substantial amount of resources were required to explain to firms and municipalities the actual charge system, including the precise methods of sampling and measuring pollution. It is safe to say that these costs of institutional change are greater than they would have been had there only been amendments to the 1957 Federal Water Act. In the end, however, the populace and the public agencies were better educated and more knowledgeable about the efficacy of using economic instruments for solving pressing public problems.

A more tentative conclusion is that the distinctiveness of the effluent charge concept required a long gestation period for the fruition of new water quality legislation. This in turn insured that all parties had ample opportunity to present their interests. If true, the resulting policies can be said to reflect accurately the relative weights of all interested parties to the decision. In response to questioning during interviews, no evidence was made available to indicate that the new laws were the product of a stacked process and evidence cited in Section 4 indicates that the law-making process was convergent.[90]

The idea of adequate representation by all parties in the political process is in marked contrast to the manner in which principal water quality legislation in the United States

allegedly occurred. In a remarkable and little known piece of public policy analysis, Marc Roberts explains persuasively how environmentalists played a disproportionate role in the passage of the Clean Water Act of 1972.[91] The U. S. Senate version, calling for a standard of zero discharge by 1983, passed a vote of 80-0. Only in the final version was the standard compromised to best available technology. Roberts argues that the technical complexity of the issue gave great authority to the subcommittees of the Public Works Committee, which handled the water quality legislation. The ranking members of the committee and the technical staff had a special position and played a substantial role in the final outcome. According to Roberts, a strong environmental influence on the staff was evident: one staff member was married to an environmental lobbyist, some staff members were persuaded that any discharges were hazardous, and the environmental lobby groups were well-organized and effective.

14.2 Local Level

The new management system at the local level was costly and it initially strained the technical expertise of the regional water boards who must help set local discharge standards which meet the Laender's stated ambient water quality objectives.[92]

To illustrate, in Bavaria the number of staff for sampling and evaluation has been increased by about 160. Additionally, in each of the 71 districts a new person has been added. In the short run, it is expected that the bureaucratic expenses of the new system will absorb one-third of the revenues from the effluent charge in Bavaria[93] and about 10 percent in North Rhine-Westphalia.

Municipalities also have an uphill battle to improve their administrative capabilities. One study states that only pH levels are collected on a routine basis and as few as about one-third of the municipalities measure COD, often in an unsystematic way.[94]

The new water policies also have imposed higher costs of administration on the private sector, as those whom we interviewed were quick to impress upon us.

Much of the increased expense must be assessed to the cost of operating an effective system in the face of rising real demand for environmental improvement in the context of a relatively fixed natural resource system. Some of the increased costs incurred by the federal government and the Laender to familiarize people with new ideas can be attributed to the charge system. These are short run by their nature. Nevertheless, they are real marginal costs of a new charge system. Finally, there may be continuous institutional costs of a charge system over and above that of a standards system. The reasoning is that a charge system, in principle, is always constraining whereas a standards system acts as a nonbinding constraint until the limits are encountered.

In the actual charge-plus standard system, the charge and hence the cost drops dramatically in half if the standard is not exceeded, so this pivot point could be a bureaucratic sore thumb. Perhaps offsetting the cost is the benefit mentioned earlier. When polluters exceed their standard and pay, the pressure to initiate costly, punitive proceedings will be less than if polluters violate a standard and do not have to pay an effluent charge on this excess.

During the course of institutional change new variables are identified, specific parameters are defined,and exact thresholds are established. Those confronted by the new laws are quick to point out that the federal government did not worry about the practical matters of implementation because this is the legal responsibility of the Laender, and it is the responsibility of firms and municipalities to respond. Those effecting and affected by the new policies tell colorful stories about how the change of a minimum standard by 0.1 units would save a particular polluter hundreds of thousands of dollars per year. Some argue that there is no scientific basis for the parameter values adopted, maintaining that no adverse harm would result if the constraints were relaxed, say, twenty percent. Others criticize what they believe to be the arbitrariness or imprecision of the testing and the monitoring procedures. While it is important to acknowledge such testimony in a research project of this nature, it is difficult to evaluate its importance.

One must bear in mind that the federal government is not a monolith. In order to pass through the gauntlet of the Bundestag (and Bundesrat), the new policies had to meet the approval of members representing disparate Laender which do have to execute the water quality laws. The minimum standards were set by task forces which had broad membership, as discussed in Section 7. No one interviewed complained about the composition of the membership of any task force. Those who cited exhorbitant costs because of a chosen parameter level were not randomly chosen from a population of dischargers. No one was asked to provide examples of the unusual benefits which might have occurred along some special reach of a river because a parameter was 20 percent higher than it might have been.

The present period can be regarded as a running-in period for the new policy. Indefensibly high and low parameter values will be discovered and replaced by more sensible values; flaws in administrative procedures will be discovered and revised accordingly.

We close this discussion with strongly favorable testimony on behalf of the effluent charge policy. One of three states to strongly oppose the effluent charge law was Schleswig-Holstein, in the northern part of the country. As a predominantly rural region, the state was concerned with the cost and the ominous task of acquiring sufficient technical capability for administering the new legislation. After a few years of experience, several experts with substantial responsibility for

administering the ECL have found it to be a far easier task than they had imagined, to their great surprise. Simple, practical ways have been devised to implement the "economic point of view". Illustratively, the need for increased analysis of samples has been handled, in part, by contracting with private labs, who are now staunch supporters of the effluent charge system.[95]

14.3 Uniform Policies Reduce Some Costs of Institutional Change

All practical and effective water quality management programs require the specification of variables, parameter and threshold values. An effluent charge system has the greatest chance of meeting the criterion of political feasibility if it is kept simple--few pollutants, strictly limited number of threshold values, uncomplicated rate schedules, etc. The bane of naive marginal efficiency is simplicity. Simplifying eventually involves making charges and standards and other debatable components of policy more uniformly aggregating and averaging. It saves transactions and political costs, but ultimately at the expense of efficiency.

One benefit ascribed to a policy which applies to all, i.e., meeting minimum requirements, is that it greatly reduces the incentive of any one firm or industry to curry special favor.[96] To do so singles one out for public scrutiny much more than if there is a distribution of policies and an entity seeks a marginal change resulting in a favorable interpretation, adjustment or reclassification. If bargaining for a narrow interest is discouraged by announcement that policies will be uniform, then it is argued that policy decisions will be made more quickly. The duration of the uncertainty about the date and content of new legislation is also reduced, creating a further source of benefit. If these arguments have merit, then the resulting benefits must be weighed against the costs of uniformity. Only path-breaking empirical research will tell us when the net benefits of simplifying rules actually are positive.

15. Effluent Charges: A Stimulus for Improved Professionalism

The effluent charge has stimulated a modest change in the professional composition of those making management decisions, placing in greater prominence those with special expertise in waste water management decisions. Ewringmann discovered that financial officers and others with economic backgrounds now were being included when some municipalities discussed their responsibilities for maintaining water quality.[97] The required improvement in water quality sharpens the relationship between cost and environmental quality. This, in turn, has brought the subject more frequently into public discussion and further stimulated the public's desire to improve water quality and find solutions to the remaining bottlenecks.[98] Whether these appetites are soon satiated by the attendant costs remains to be seen.[99]

Care should be exercised about giving too much credit to the effluent charge portion of the new policies. The acknowledged need to improve water quality translates into applying more pressure on polluters, enforcing laws more frequently, and punishing more severely. Thus monitoring and measuring procedures have to be improved, because the legal demand for greater accuracy has increased.[100] This would have occurred to some degree in the absence of an effluent charge because regulations in some form had to be toughened. However, actual levels of discharge are more important than with a standards system alone and call for more accurate measurement. This is true, first, because the actual payment jumps by 100 percent when one exceeds the minimum; second, because in unusual cases--when discharge is 25 percent or more below the minimun or when discharge is above the minimum--the actual level is econmically important; and third, because compliance is based more on quantitative criteria than hitherto was the case. On balance, the present effluent charge system must be administered by a higher scientific quality organization.

16. Implementation Pitfalls

Many a good idea remains stillborn because the difficulties of implementation are insurmountable. Proverbs such as "seeing is believing" poignantly emphasize this all too frequent occurrence. We have addressed the charge that the problems of implementing an effluent charge system are exacerbated because the federal government enacted legislation which another governmental unit, the Laender, had to put it into practice. Two major practical problems discussed were the difficulty of developing acceptable procedures for testing the concentrations of specific residuals discharges and resolving the controversy over acceptable threshold levels of concentrations.

Probably the two largest stumbling blocks remaining in the way of practical implementation are devising acceptable and effective policies for handling storm water runoff and charging

indirect discharges. About 90 percent of all firms in the FRG discharge their effluent into the sewerage systems of municipalities and are not directly liable for the effluent charge.[101] The difficulties with surface runoff are easily understood. The bill for residuals discharge is the product of volume, concentration and price. Storm water runoff increases the cost of purification. Thus the cost of meeting a uniform standard is higher for municipalities and areas which experience storm water above the national average. Schleswig-Holstein and Lower Saxony are two such areas. They have spoken out strongly on this issue and will exclude storm waters from their charge system.[102]

Three elements of the indirect discharger problem warrant discussion. First, how are those whose waste enters municipal systems to be charged; second, do their costs resemble the costs of direct dischargers; and third, can there be relief for a firm whose economic viability is threatened by charges a municipality levies for that firm's discharge?

An important criterion for a municipal charge system is administrative simplicity. This feature is sacrificed to the degree that a second desirable characteristic, the polluter-pays principle, is achieved. Ideally, each firm faces a (marginal) charge that reflects the (marginal) cost of discharge imposed on the municipality. For example, firms with high concentrations of cadmium, mercury, COD, settleable solids or toxicity would pay more than those with lower concentrations in their expected waste. In this manner, the polluter-pays principle is passed back to the entity making the marginal pollution decision.

In practice, municipalities in the FRG have charge systems so rudimentary that the cost of waste treatment is embedded in the charge for fresh water withdrawals. According to one study, less than one-half the municipalities made any distinction at all in a polluter's effluent concentration in computing a sewage bill in the FRG during the late 1970s.[103] It is fairly clear that the charge policy is used primarily as a financial instrument by the municipalities and not as an allocative device. Thus, finding a solution to the practical pricing policy problem has wide ramifications in terms of efficiency.

When all firms are homogeneous in their residuals discharge, municipalities can continue to practice undifferentiated charge systems. When individual discharge varies greatly in volume and concentrations, a pricing policy which does not distinguish differences in volume, concentration or pollutants will greatly favor the big pollution-intensive industries and discriminate against the mild polluters. A uniform pricing policy acts as a wet blanket on incentives to reduce discharge, which would be undertaken by an estimated 80 percent of the firms for a cost lower than the municipalities to which they are hooked up.[104]

In recognition of the nationwide problem of revising municipal charge systems, the Umweltbundesamt (EPA) commissioned

a study of charge systems for the purpose of providing guidelines useful to all municipalities.[105] The study developed a self-evaluation scheme based on a municipality's desired degree of purification, level of toxicity and pollution concentration, and industry share of effluent, to help municipalities select an appropriate level of complexity--charge differentiation--for their effluent charge system. Alternative charge systems which were administratively simple and had incentive elements were discussed at some length.

The impetus for the study may have been provided by a previous study commissioned by the EPA to investigate the effects of the effluent charge on indirect dischargers. According to that study about 40 percent of the municipalities did not actually have nor did they have plans for adopting a waste water pricing policy which charges a firm more if they have higher concentration effluents.[106]

Fairness between the direct and indirect discharger with regard to the federal water quality laws is a consideration which should be raised. However, inadequate data preclude reaching definitive conclusions. Even qualitative answers are not possible because of the presence of two major counter forces as is seen below.

Subsidies to municipalities and non-fee revenues such as ad valorem taxes tend to decrease the cost of effluent treatment to indirect dischargers.[107] The advantage will decrease to the extent that subsidies from the effluent charge revenues will be made available to firms. On the other hand, indirect dischargers pay for treatment of storm water runoff which is not of their making but can amount to as much as 50 percent of the total cost in some communities.[108]

Turning to the problem of the marginal firm, the application of the polluter-pays principle creates practical difficulties (raises the question of fairness) when the discharge of one firm is so noxious that a municipal treatment plant cannot meet the minimum standards. A likely candidate is a firm employing galvanizing processes. Should the firm be liable for the full charge increase applied to all the treatment plant's waste? What if the firm goes out of business as a result? This problem is under discussion in the FRG and will be an issue in the United States if an effluent charge is introduced.

The Land Hessen has provisions in its law for municipalities to place full liability on the polluter.[109] Michaelis in his interview intimated that the Ruhrverband does not find it easy to adopt effluent charge policies which bankrupt a firm, however theoretically justified they may be.[110]

17. <u>The Effluent Charge; A Potential Cause of Resource Inefficiency</u>

Rarely can improvements in public policy proceed in all directions at the same pace. The purpose of this section is to identify and underline the unavoidable waste which occurs when progress is asymmetric.

When the cost of using natural water quality increases, and polluters search for ways to make cost saving substitutions, one natural option is to discharge into the air. If air quality and air policies are not scrutinized publicly at the same time, not only can air quality deteriorate as a result of improvements in water quality but society can be made worse off on balance. This will occur if the costs of air quality deterioration more than offset the net benefits of water quality improvement.

Although the instructions to the task forces were requested to take other areas of the environment into account,[111] none of the members were described by those whom we interviewed to have expertise in or responsibility for air quality management. Members setting minimum water quality requirements were described as water quality specialists. Thus there is no built-in guarantee that air quality's "interests" were being watched. The same commentary applies to other potential resource substitutes such as land and ground water.[112]

A second adjustment open to polluters is to substitute water sources. Not only can one expect an increase of residuals discharge into marine environments for which no charge is levied, but one can expect a substitution of ground water for surface water in two senses. In the first case, indirect dischargers, who pay for the costs of effluent treatment through the bill for water withdrawals from the municipal system, naturally will try to withdraw ground water as a substitute.[113] Fortunately not many possess the legal right to withdraw water from the ground. Second, some polluters will be encouraged to avoid charges by discharging waste water in such a way that it is reabsorbed into ground water aquifers. Fortunately again, this is not legally permissible, but vigilant surveillance of aquifer water quality is a prudent step to take during these years of transition. Finally, those responsible for managing solid waste disposal on land can expect increased pressure on their services as a result of the new water quality mangement laws. Since no empirical analysis of these concerns has been undertaken, the purpose of this section is merely to alert readers to a potential problem.

18. Incorporaating Effluent Charges into U. S. Water Pollution Control Law.[114]

The existing U. S. system of water pollution control is dominated by a legalistic approach in two ways. First, it emphasizes as its goal the total ban of discharges of wastes into public waters instead of applying cost-benefit principles which would proscribe only those discharges of waste which are not cost-justified for a particular body of water, considering the alternative uses for those waters and their assimilative capacity. Secondly, the U S. system relies heavily on the

threat of punishment, i.e., fines and/or imprisonment, rather than on economic incentives to induce industries, municipalities and other waste dischargers to reduce the pollutants they discharge into public waters.

The first of the above two concepts, the ban-the- discharge approach, was explicitly incorporated into the Federal Water Pollution Control Act (FWPCA) Amendments of 1972, and has been subjected to heavy criticism by the National Water Commission in its 1972 final report "Water Policies for the Future", by the National Commission on Water Quality in its 1976 report, and by independent economists. The principal basis for this criticism has been that the cost of carrying out such a program is simply too high, given other demands on public funds. Achievement of the no-waste-discharge goal by 1985, or any other time, would be so costly as to require giving up other goals that have a higher social, political, and economic utility. The critics note that while most pollution, possibly as much as 90 percent, can be stopped or removed at acceptable costs, removal of the final few percentage points becomes exceedingly expensive. Stringent limitations on the discharge of toxic substances into public waters may be justified on the ground that they pose a direct and immediate danger to human health, whereas a similar ban on the discharge of other pollutants seldom has such powerful justification. Indeed, such waste discharges may cause insignificant harm either to humans or fish and wildlife in view of the assimilative capacity of the particular body of water.

It was not surprising that the 1977 Amendments to the Federal Water Pollution Control Act altered the emphasis of the federal program in the direction of the receiving water standards approach and away from the no-waste-discharge principle. This change is important to our consideration of effluent charges as a supplement to the existing pollution control system. While effluent charges are consistent with a receiving water standards approach they tend to conflict with the ban-the-pollution approach. Effluent charges are based on the assumption that some wastes will continue to be deposited into public waters, and that such use is not, per se, legally wrong or inherently evil. An effluent charge system is a legitimate means of helping to allocate the use-opportunities for this resource among competitive interests. In addition such a system will create a pool of revenues that can be used for the construction of treatment facilities, research, and pollution control administration.

It should also be noted that the adoption of an effluent charge system is consistent with the current administration's support of the "user fee" concept. Instead of imposing the costs of water pollution control, administration, research, enforcement, and construction on the general taxpayer, these costs are borne by those who use public waters for the discharge of their wastes and who therefore benefit most directly from the use of this resource.

The above discussion leaves unanswered the more basic policy question of whether an effluent charge law should be enacted at the state level or at the federal level. We do not take a position on this issue here, believing that this is a matter for the Congress and the various state legislatures to decide. We will, however, portray the three major options that are available and note some of the advantages and disadvantages of each.

(1) The federal government could enact an effluent charge law for the entire nation, and could collect the charges and disburse them as it saw fit. Under such a plan Congress might carry forward the same federal-state relationship that is used in administering the Clean Water Act (CWA) Thus a state would be permitted to implement the charge system under continuing federal supervision, so long as the state met federal standards. Alternatively, if a state decided not to implement the federal charges program, EPA would itself carry out the implementation in that state. (2) The states could enact effluent charge systems of their own choosing, so long as their choices were not preempted by the Clean Water Act. (This issue is discussed below.) (3) The federal government could enact a law that would set minimum requirements for any state effluent charge law. States could then enact such laws as they chose, so long as those laws met federal standards. If a state chose not to have an effluent charge law, then none would exist in that state, i.e., EPA would not implement any federal charge system in that state.

19. Congress's Power Under the Federal Constitution to Enact an Effluent Charge Law.

There is little doubt that Congress has the constitutional power to enact an effluent charge law applicable throughout the United States if it chooses to do so.

A casual look today at the exercise of governmental powers in the United States, between the states and the Federal government, might convince the modern observer that the 1787 Constitution allocated the major share of governmental powers to the national government. The federal government's presence can now be seen and felt everywhere, in all aspects of legal, social, environmental, and economic affairs. However, quite the opposite perception prevailed when the Constitution was adopted. At that time it was everywhere recognized that the basic sovereign powers of government resided in the states. The national government had no inherent powers of sovereignty. Its entire governing authority had to be carved out of the powers that were then held by the states. The Constitution was in fact a delegation of a certain few limited powers from the states to the national government.

This perception prevailed until well into this century and was reflected in the fact that the great bulk of legislation that has existed until recently was produced by state legislatures. It has been primarily the post-World War II era that the federal government has moved directly and comprehensively into the field

of social, economic, and environmental regulation.

The water pollution control field was completely dominated by state regulation until the mid-1960s. By then it had become apparent that state regulation was failing to achieve the kind of water pollution control desired by the public. At first the federal intervention was gradual. In the Water Quality Act of 1965 Congress sought simply to oversee state regulation, and made no attempt to regulate waste discharges directly. It was not until 1969, with the rediscovery of the Rivers and Harbors Act of 1899, that the federal government undertook through the Corps of Engineers permit system to regulate directly the discharge of wastes into public waters by industries. Then in 1972 the federal government changed the rules of the game entirely and took over the field of water pollution control from the states, essentially reversing the federal/state roles and thereafter allowing state regulation only under strict federal supervision.

The courts have supported this expansion of the federal government's role in the environmental as well as in other areas of social and economic regulation, and have done so via an increasingly broad interpretation of Article I, Sec.8(3) of the federal Constitution, the so-called "Commerce Clause". This clause says that Congress shall have the power "to regulate commerce with foreign nations, and among the several States". Prior to the 1940s the Supreme Court had interpreted this language to limit Congress's legislative power to matters more or less directly connected with actual commerce. A body of water had to be navigable, or affect navigability, to come within the reach of this aspect of the commerce clause power, although in cases such as United States v. Appalachian Electric Power Co., 311 U.S. 377 (1940), the Court had broadened the meaning of "navigability" for commercial purposes to cover not only tributaries of navigable waters but also waters that could be made navigable by reasonable improvements.

In 1942, the Court moved entirely away from the concept of navigability as a limit on congressional power to legislate under the commerce clause and ruled that this power extends to any activity that "affects" interstate commerce. In Wickard v. Filburn, 317 U.S. 111 (1942), the Court held that Congress could constitutionally enact a law regulating the acreage of wheat a farmer could plant even though the wheat was destined solely for use on his own farm. Conceding that the amount of wheat involved was trivial by itself, the court concluded that taken together with that of many other farmers similarly situated, homegrown wheat could be sufficiently competitive with wheat in commerce to affect substantially the price of the latter, thus justifying regulation of all production. Thus wheat farming, though not directly producing articles of commerce, was within the reach of Congress's power under the Commerce Clause becuase it "affected" interstate commerce.

Subsequent cases have established the applicability of this principle to the environmental law field. In United States v.

Ashland Oil & Transportation Co., 504 F.2d 1317 (6th Circuit 1974), the court held that Congress had the constitutional authority to enact the Federal Water Pollution Control Act Amendments of 1972, by which the federal government took over much of the direct regulation of water pollution. About the impact of water pollution on interstate commerce the court said

> "Obviously water pollution is a health threat to the water supply of the nation. It endangers our agriculture by rendering water unfit for irrigation. It can end the public use and enjoyment of our magnificent rivers and lakes for fishing, for boating, and for swimming. These health and welfare concerns are, of course, proper subjects for congressional attention because of their many impacts upon interstate commerce generally. But water pollution is also a direct threat to navigation--the first interstate commerce system in this country's history and still a very important one."

Other potential impacts of water pollution that "affect" interstate commerce easily can be identified, any one of which would justify Congressional legislation on this subject.

It seems clear therefore that Congress has the constitutional power under the commerce clause to enact an effluent charge law to control water pollution, if it chooses to do so.

20. Constraints on Congress's Power to Legislate.

The Bill of Rights of the federal Constitution contains two clauses that could possibly be argued as the basis for challenges to a federal effluent charge law: the due process and equal protection clauses. However, assuming that such a law is carefully written and reasonably related to the pollution goals to be achieved, any such challenges should fail. The due process and equal protection clauses guarantee the basic reasonableness and fairness of any legislative scheme.

The due process clause has two separate aspects, one called "substantive" due process and the other "procedural" due process. Under the substantive due process requirement a person can insist that his property not be taken by the government without payment of compensation. This concept generally has no application to waste dischargers, however, because the courts have held that a person does not have a legally vested property right to pollute, at least not such a right as requires payment of compensation for its loss by government regulation.

Procedural due process requires generally that fair procedures be followed in applying any regulatory scheme, such as reasonable notice of hearings and orders, and the opportunity to present one's own arguments before a proper forum. Any defects in procedural due process can be corrected by merely changing the procedure to one that meets the court test of fairness.

The principal tenet of the equal protection doctrine is that persons similarly situated should be treated alike under the law. Conceivably an industrial waste discharger might complain that he was being charged more than another disharger who was similarly situated. However the courts have almost uniformly rejected such claims unless the differential treatment is based on race, gender, or some other suspect classification.

Nearly all laws have a differential impact on different groups or classes of persons. Where the law infringes on a fundamental right such as the right to vote, or is based on a "suspect" classification such as race, a court will examine it with exceptional care, giving it what is called "strict scrutiny". A court will uphold the law only if it is "necessary" to serve a "compelling state interest". Laws that do not infringe on fundamental rights or deal with suspect classifications receive only "minimal scrutiny," and will be upheld if a rational relationship can be discerned between the law and the goal sought. Under this rational basis test the government has broad discretion in enacting laws which affect some groups differently than others. Few legislative enactments have been struck down under this test. There is no reason to believe that a carefully drafted effluent charge system would fail to meet this test.

21. State Authority to Enact Effluent Charge Laws

The states also have the legal power to enact effluent charge laws if they choose to do so. As noted above, states have enacted health and environmental laws for a much longer period of time than the federal government. The states' powers to enact such laws falls under the classificatin of state "police power", and extends to the protection of the health and welfare of the people within the state. Such legislative authority has been used to protect health, morals, aesthetic appearance, environmental quality, recreation, fish and wildlife, and economic welfare. These powers have been upheld by courts in all the states as well as in the federal courts.

The more serious challenge to state effluent charge laws arises from two other sources: (1) that such a law might violate the federal Constitution's "dormant" commerce clause requirement that guarantees free interstate commerce; and (2) that such a law might be preempted by existing federal statutes in the field of pollution control. Under the first such challenge the courts have held that legislation may be suspect if it places a greater burden on out-of-state enterprises than on those operating within the state. Nowak, Rotunda and Young have said that "the rationale of the Commerce Clause was to create and foster the development of a common market among the states, eradicating internal trade barriers, and prohibiting the economic Balkanization of the Union. Approval of discriminatory regulation enacted by one state would merely serve to invite retaliatory legislation by the burdened jurisdictions."[115] The typical case of an invalid state law under this concept is illustrated by the law that places special requirements on trains (limiting length) or trucks (mud flaps) that pass through the state on interstate travel.

There is no reason to believe that a state-enacted effluent charge system would violate the "dormant" commerce clause. We agree with Anderson and co-authors[116] in their carefully supported conclusion that the dormant commerce clause is "not important to the charges approach" because "most charges plans can function effectively without unreasonable impacts on interstate commerce."

The question of federal preemption of state water pollution control laws is more complex. Under the supremacy clause of the federal Constitution,[117] if Congress enacts a law that conflicts with a state law or that occupies the field so completely that no room is left for state control, then the state law is preempted and cannot stand. It is clear that Congress could enact a comprehensive effluent charge law that would preempt any state laws in the field. However, most federal legislation in the environmental field provides that state laws on the same subject are not preempted if they are more strict than the federal act. If such a provision were included in the federal effluent charge law then a state could, if it chose to do so, levy charges that would be added on to those levied under the federal law.

A related question is whether existing federal water pollution control laws occupy the field so completely there is no room left for the enactment of state effluent charge laws. This question may be answered by the provision in the Clean Water Act that expressly reserves to the states the power to enact water quality laws that set standards stricter than those promulgated under the federal act. One might argue that it is impossible for states to have stricter standards than the federal law, at least after 1985, because after that date the nation will have achieved the no-discharge goal. It is everywhere conceded, however, that this "goal" will not be achieved by 1985, or at any identifiable time after that. The 1977 amendments make clear that the government intends to perpetuate a technology-based program of pollution control into the foreseeable future. Such a program allows sufficient leeway for implementation of state effluent charge programs.

A technology-based federal program might, however, give rise to the argument that state effluent charges could not be levied so long as the waste discharger was meeting the federal technology-based standards. We believe that such an argument would likely fail because state effluent charge systems would seem by their very nature to be premised on stricter standards than those required under federal law, and would come within the provision of the federal act that explicitly allows stricter state law.[118] However, a court might hold that the federal disclaimer allows stricter state standards only in terms of the quantities of chemical or other substances discharged and not in terms of charges assessed against polluters. We recommend therefore, that Congress enact an amendment to the Clean Water Act to make it clear that state effluent charge laws would not be preempted by existing federal pollution control laws.

Under an amended Clean Water Act, the states could continue to implement their own standards-oriented water pollution control systems as they do now, so long as they meet federal standards. (About half the states have met these federal standards and carry out their own programs under the supervision of the Environmental Protection Agency). The amendment would make it clear that the states could add a charge system to their bag of tools for controlling pollution.

As noted above, congressional legislation in this area might take one of two basic approaches. It could simply provide that the states could enact whatever charge systems they deem appropriate, and that those systems would not be preempted by existing federal water pollution control law. Secondly, the federal act could set minimum physical standards and minimum charge standards for state effluent charge laws. Obviously a major concern in making the choice between these two, or among other variables, will be to assure that the nation does not return to the era when industries were able to bargain one state's pollution control laws against another and threaten to move from states with strict laws to those with more lenient programs.

22. Variations in Effluent Charge Levels by State or Region

If Congress enacted an effluent charge law, should that law establish uniform charges for waste dischargers all across the nation, or should it vary those charges by state or region? If the charges are uniform everywhere then the states or regions with cleaner waters may complain they are being penalized because their charges are higher than necessary to achieve the desired water quality levels.

One important argument in favor of uniform national charges is that if variations were permitted, some states might set their charges very low for their less developed regions with less pollution, thus inviting industries to shift their location, and their pollution, to these areas. Such a possibility could well raise the ire of both environmentalists who want to keep the clean areas clean, and of larger cities and industrialized areas who want to keep jobs.

Probably the most important reason for applying a uniform charge across the nation is the political difficulty of deciding upon the level of charges that should be applied in different regions. There is simply no acceptable formula for regionalizing charges at the national level without creating great, and possibily disabling, political controversy. Nonetheless some modifications in the uniform charge theme might prove feasible and politically desirable. Some of these are suggested by Anderson and coauthors[119] and include special surcharges on new plants, allowing states some variation but with a federally established minimum charge below which the states cannot go, recognition of assimilative capacity as a basis for modest charge adjustment, and application of a varying time schedule for phasing in charges reflecting the different amortization needs of diverse industries. These approaches, as well as others that might be conceived, would tend to discourage migration of industries from one state or region to another and at the same time would speak to the complaints of environmentalists who want to discourage degradation of the more pristine areas.

If states enacted their own effluent charge systems, without the constraint of any federal minimum, then significant variations are likely to exist between the states, and the political problem of threatened industrial migration can be expected.

23. Collection and disbursement of the revenues from an effluent charge system.

If the states adopt their own charge systems, either under federal guidelines or on their own, then presumably the charges collected would go to the states to be spent for water quality administration and improvement according to priorities established by each state legislature.

If an effluent charge system is enacted and implemented at the federal level, Congress could provide either that the charges would be collected by EPA and disbursed by EPA pursuant to federally established priorities, or that the charges would be collected by the states and disbursed according to state established priorities.

If revenues were spent in the United States for administrative costs and water quality improvement expenditures as they are in the FRG, then the charge revenues that are spent for administration would have to be divided between EPA and the states, at least in those states that implement their own programs. Additional funds could be used for pollution control related purposes as determined by Congress and/or the state legislatures.

24. Could an Effluent Charge System Be Grafted Onto the Present Technology-Based Standards System?

No insurmountable legal problems should arise by enacting an effluent charge system on top of the current standards system. As noted above, the current water pollution control system in the United States, while professing a no-discharge-by-1985 goal, is in fact a technology-based system, applying criteria such as best available technology or best conventional technology. Under this system the states have set ambient water quality standards for receiving waters. For many bodies of water, these standards are being met, or can be met by application of the technology-based standards. For other waters, however, these technology-based standards are deemed too lax to assure compliance with existing standards. For these waters Sec. 303(d) of the CWA requires that they be classed as water quality "limited segments"; special procedures are then established to encourage achievement of the desired ambient water quality level.

It seems obvious that an effluent charge system could appropriately be applied to waste dischargers on the "limited segments" of water where technology-based standards will not achieve the desired ambient water quality standards. Effluent charges would be an appropriate means of encouraging industries and municipalities to improve their technology, or to consider alternative means of disposing of their wastes.

A different situation arguably could exist regarding those waters where the ambient water quality standards have been achieved. On these waters the waste dischargers might claim that charges are inappropriate because the desired water quality has already been achieved. A somewhat similar argument might be made by an industry (on any body of water) that is using the legally required level of technology, i.e., "why should I have to pay effluent charges when I am using the level of technology required by law.?" The answer to these arguments is that both the ambient water quality standards and the technology-based standards are only waypoints, they are not final destinations. Because of continuing population and industrial growth, and the need to

dispose of an ever-increasing quantity of waste material, we need to continue developing better waste control technology, and alternative methods and locations for disposing of wastes. An effluent charge system provides a built-in incentive for encouraging such continuing efforts.

The data presently generated by the NPDES system make it quite feasible to adopt an effluent charge system with only modest additional effort. The applicant for a discharge permit under the National Pollutant Discharge Elimination System (NPDES) must provide EPA or the relevant state agency extensive and precise data on the quantity and content of the wastes to be discharged under the permit. These data include chemical parameters, metal content, physical and biological parameters, and radioactive parameters, and cover a total of some 68 different items. The permits identify the permissible discharges of each of these substances, and require appropriate self-monitoring to assure that the permissible limits are not exceeded, or if exceeded are reported. The Environmental Protection Agency and the relevant state agencies have a well established spot-monitoring system of their own to assure the validity of the self-monitoring system. With this body of data already available it would not be technically difficult to graft an effluent charge system onto the present regime. The information on which such charges would be based is already in existence. The principal decision that would have to be made concerns the choice of the wastes that would be the basis of the charges.

One of the surprising consequences of the enactment of the FRG charge system was the degree to which more complete and more precise data were developed because money changed hands on the basis of that data. While the United States if further along now than the Germans were when they enacted the effluent charge law - and we have considerably more data than the Germans did then - it nonetheless seems likely that implementation of an effluent charge system here would also generate important new informatiopn, for the same reasons - money changes hands on the basis of that information.

25. Synopsis

The Federal Republic of Germany's 1976 Effluent Charge Law was produced at the crest of that nation's environmental movement and against a background of broad support for the application of market economics to resolve the country's water pollution problems. The ECL was designed to operate in tandem with the existing standards/permit system established in a 1957 law and modified in 1976 Amendments.

The Effluent Charge law was enacted by the Budestag and Bundesrat as a framework law because the FRG Constitution requires that all implementation and enforcement of water management laws must occur at the Laender rather than the federal level. All the Laender have subsequently adopted implementation laws and enforcement programs. The federal act established a minimum national water quality goal, and authorized federally created task forces to set technology-based standards for all industries and municipalities. The recommedations of these task forces had to be confirmed by the Ministry of Interior and the Bundesrat which approximately resembles the U.S. Senate.[120] The federal act also determined the pollutants on which the charges are to be based, and set the annual charges for each pollutant. The Laender carry out all enforcement of the Act, including timing of implementation, collection and disbursement of charge revenues.

The technology-based standards established uniform thresholds for individual discharge level across the country. The Laender can set higher minimums if they are necessary for achieving particular quality goals in given water bodies.

The effluent charge system enacted in 1976 is tied to five pollutants: settleable solids, COD (chemical oxygen demand), mercury, cadmium, and toxicity to fish (Sec. 6). The charge level starts at 12 DM (about $5.00) per damage unit in 1981 and rises to 40 DM (about $16.00) per damage unit in 1986. A damage unit is a specified amount of effluent such as 45.45 Kg of COD. The charge per damage unit is uniform across regions and polluters.

Each discharger pays for the expected amount of pollution stipulated in the effluent charge portion of the individual permit. The charge liability is lower under two circumstances. If the expected discharge level meets the federal minimum standards, the unit charge is reduced by one-half (e.g., from 12 DM to 6 DM in the first year). Second, if the actual discharge level is substantially below the expected level, the bill is based on the actual level of discharge.

When maximum levels of discharge, stipulated in the permits, are exceeded, polluters are penalized by having to pay more in the future.

Revenues from the charges can be used by the Laender for the costs of administering the ECL and for supporting pollution abatement activities such as research for innovations in technology; tertiary treatment plants and other investments which inmprove water quality beyond the mminimum desired levels; lake rejuvenation; and large-scale, economical treatment plants which benefit region.

Lessons learned from the short experience of the FRG are that an effluent charge system is most likely to be politically viable and administratively attractive if:

1) It covers a small number of pollutants--under six;

2) It is combined with permit systems;

3) The charges begin at some specified level and escalate during a transition period;

4) The charge levels result from a process involving the participation of interested parties including those benefitted and harmed by waste dischargers;

5) Measures and levels of volumes and pollution concentrations are simplified;

6) Effluent charge revenues are made available for abatement-related expenditures[121]--see below;

7) Hardship clauses are provided to protect dischargers or industrial sectors under exceptional circumstances (Section 6.1);

8) Controversy over "regionalization" of the charges is faced squarely; and

9) Care is taken to demonstratae how the effluent charge program actually can be implemented (Section 16).

If an effluent charge system meeting the above constraints is implemented, we can expect:

1) Charges to increase the incentive for firms to find treatment technologies, substitute production processes and substitute input and output combinations which diminish residuals discharge. The qualitative evidence is that firms whose standards did not change because their discharge licenses did not change, generally found ways to reduce their charge obligation. An intra-firm effluent charge system resulted in a 20 percent decline in waste discharge in the seven years since its introduction (Section 10).

2) Charges to increase the incentives for municipalities to adopt customer sewage pricing policies which not only are acceptable financial instruments but also offer incentives for the indirect dischargers to economize on waste production (Section 10).

3) Charges encourage, if not require, municipalities to find satisfactory procedures for better monitoring of the intake and outflow of effluent This will help public authorities to reduce the average cost of their sewage services and will aid them in executing an effluent charge policy which better reflects the marginal cost of treating a given customer's effluent (Section 12).

4) If a charge system is generating billions of dollars per year in revenues, it is likely that this source increasingly would look attractive as a substitute to the U. S. Treasury for pollution abatement subsidies. Since revenues have yet to be collected in the FRG, there is no evidence to support the concern of several water quality experts interviewed that this substitution would take place. A decreased dependence on the Treasury redistributes the cost of pollution from the general taxpayer to the consumer of pollution intensive products and to the owners of factories specialized in the production of those products. Such a shift in the source of the polluter-pays principle (Section 11).

5) The present system of subsidies in the U. S. for waste treatment rewards capital intensive municipal waste treatment technologies by subsidizing capital expenditures. By encouraging municipalities to use more operation and maintenance expenses to reduce waste discharge, the effluent charge system helps to correct resource allocation distortions the subsidies created.

6) If revenues generated from charges are made available for expenditures for water quality improvement, some portion of these funds will be available for use by industry. The present subsidy system in the U. S., by excluding firms directly (except for fair credits favoring "end of pipe" charges), distorts the marginal cost of waste treatment between private (firms) and public (municipality) dischargers. There may be equity considerations which justify the present policy, but such goals are achieved at the cost of a lost in efficiency. These losses will be mitigated, in part, if firms qualify for subventions. Final discussions prior to the passage of the ECL defined

the uses of charge revenues to include industrial expenditures for effluent reduction-production processes, in addition to more straightforward pollution abatement expenditures (Sections 10 and 15).

7) If the cost of administering and enforcing the effluent charge system is covered in part or totally by revenues created, as it is in the FRG, then we can expect greater availability of enforcement services and more compliance compared to the precharge period. There is too little empirical evidence regarding enforcement levels in the U. S. to know whether and to what extent the present situation is optimal. There is the danger of excessive enthusiasm for enforcement when the budget for enforcement comes from charge revenues. Representation of heterogeneous interests on a board in charge of revenue disbursement is one way to reduce the chance for this resource misallocation -- admixtures are effective antidotes for excessive zeal (Sec. 13).

8) Introducing an actual effluent charge system on top of a standards system, in all likelihood increases the total cost of educating legislators and others unfamiliar with such a policy so they can vote intelligently. In return, water quality is improved and the flexibility, quality and precision of the management program is improved when more policy options are available (Sections 14 and 15). Moreover, the costs of familiarizing policy makes about economic instruments may be thought of as an investment. Returns will be realized when discussions of policy issues in the future embraces economic solutions.

9) An effluent charge system combined with a permit system creates a more flexible assortment of policy tools capable of better responding to changing circumstances than either system alone (Sec. 12).

10) If managers of other natural resources such as ground water, marine waters, air and land--which --are substitute waste sinks for fresh water bodies, are engaged at least in an advisory capacity in the design of the charge system, spillover losses into these substitute areas can be reduced (Section 16).

11) In recent years, the introduction of the bubble concept has improved the efficiency of water quality management in the United States. Residuals producers are permitted to trade environmental quality permits. The bubble concept introduces greater flexibility into the system by

enabling exchange, in effect, to remove constraints on some firms' behavior. Is a charge system unnecessary if a bubble policy is in place? Other things being equal, the introduction of charges results in a loss of revenues to polluters. Alternatively put, the implicit value of discharge permits is depreciated by the introduction of an effluent charge. In contrast, since introducing the bubble removes some constraints, the value of tradeable permits increases. Thus, the distributive consequences of these two policies is quite different. In practice, the efficiency aspects seem to be different. To date, the number of air pollution offsets consummated is modest and the number of water quality trades is miniscule. This suggests that there are practical impediments to the development of offset markets in water. These may or may not be of a short-run nature. On the other hand, the effluent charge impinges on all municipalities, direct dischargers, and on some indirect dischargers. Thus the effluent charge system generally is superior to a bubble system.

The extent of the resource savings created by an effluent charge depends largely on its magnitude. What is clear from this discussion is that in a pollution offset program, effluent charges are complementary, not competitive programs, when the criterion is economic efficiency.

Finally, if the experience in the Federal Republic of Germany is a guide, the introduction of an effluent charge will improve water quality (Section 10).

In the United States it is clear that Congress has the constitutional power to enact an effluent charge law for the nation as a whole. Alternatively Congress could enact a "framework" law estalishing minimum standards for state effluent charge laws, and then allow the states to enact such laws as they saw fit. Objections might be raised to federal or state effluent charge laws on the basis of constitutional equal protection and due process grounds, but these objections would fail.

States have authority to enact effluent charge laws under their own constitutions, and under the federal constitution. However state water pollution control laws might be preempted by the extensive federal regulation in the field. The Clean Water Act (CWA) explicitly provides that state laws are not preempted by the federal Act if they are "stricter" than the federal law, and state effluent charge laws might conceivably meet this criterion. However sufficient uncertainty surrounds this question that we recommend enactment of federal legislation explicitly authorizing state effluent charge laws.

An effluent charge law could be enacted in the U. S. to operate in tandem with the existing CWA standards/permit system. In spite of the much publicized no-discharge "goal" of the Clean Water Act, the system actually is technology based. It would be quite feasible to coordinate an effluent charge law with the existing NPDES system. The data generated by the NPDES process provides the technical information that would be required for establishing effluent charges. An effluent charge system should not excuse waste dischargers merely because they are meeting the technology-based standards.

Caution should be exercised about considering variations in charge levels if they are initiated by a state or a region. Not only is it exceedingly difficult to determine the technically proper and politically acceptable variance, but such variances might also encourage industries to bargain among states for the lowest charges.

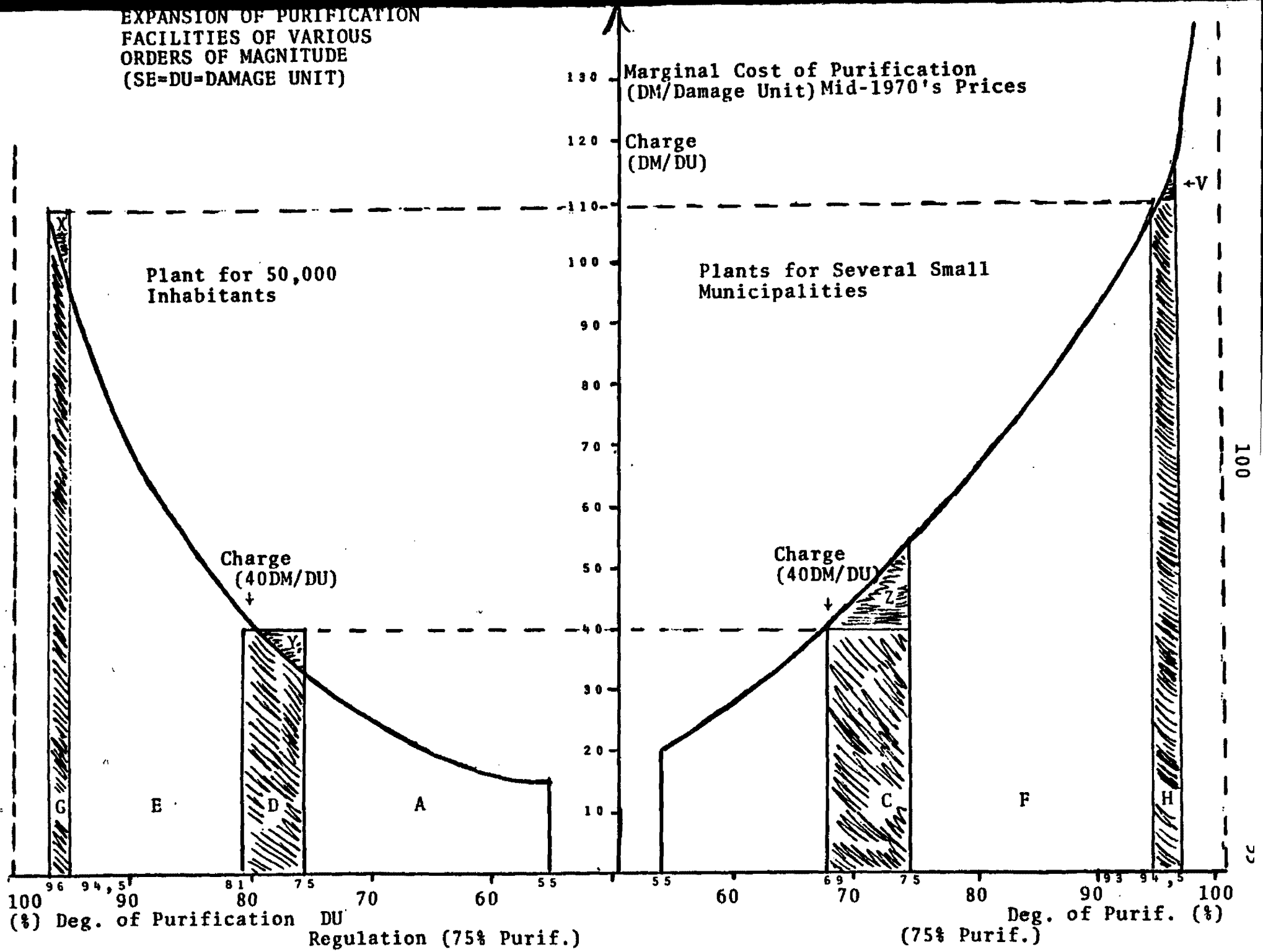
APPENDIX A. PROBABLE COUNT OF DIRECT-DISCHARGERS ACCORDING TO INDUSTRIAL PRODUCTION GROUPS[a]

TASK FORCE NO.	BRANCH OF INDUSTRY	NUMBER OF DIRECT DISCHARGERS[b]
1,6	Plastics, Synthetic Fibres	About 10
2	Acid, Alkali, and Halogen Production	8
36	Organic Pigments	1
4	Inorganic Pigments	9
5	Soda	4
7	Meat	50[c]
8	Brewery, Mailting	250
9	Dairy	35
10	Margarine, Oil, Fat	10
11	Fruit & Vegetable Canning	.[d]
12	Wine	0
13	Spirits	29
14	Yeast	2
15	Starch	8
16,20	Mineral Water, Soft Drinks	.[d]
19	Potato Products	7
22	Sugar	About 50
24	Cellulose, Pulp (Paper)	13
25	Paper, Cardboard	110
26	Wood	6
27,28	Textile	60
29	Leather Tanning	4
31	Iron and Steel	About 135
32	Non-ferrous Metals	60
33	Galvanizing (Electroplating), Hardening, Etching	50-100[e]
34,35	Auto & Machine Const'n	At least 300
36	Coke	11
37	Ore-Dressing	About 15
38	Mining (Bituminous Coal)	17
39	Lignite Briquet	5
40	Refineries	30
41	Waste Heat and Residues (From (Utilities) Power Plants)	15[f]
42	Glass	About 730[g]
43	Fine Ceramics	.[d]
44	Quarries	About 33
45	Offal Processing	9
46	Gelatine	6[h]
47	Potash (Potassium) (Hydroxide)	About 15[g]
48	Other Fertilizers (Excepting Potash)	4-8
50	Halogenated Compounds	8
51	Petrochemicals	4
52	Pharmaceuticals	1
53	Pesticide	45
55	Food Drying	

58	Calcium Carbide, Silicon Carbide Production	About 8[g]
59	Used Oil Refining	.d
60	Aliphatic Oxycarbon Acid, Citric Acid Production.	2[g]
TOTAL[i]		2369-2423

a. Divided according to task force in accordances with section 7a WHL.
b. Standing as of May 1980.
c. Plus about 1800 very small dischrgers.
d. No statement was possible.
e. Plus about 100 very small dischargers.
f. Statements for Bavaria only.
g. Number of plants.
h. Plus 9 operations in the Siedesalz area.
i. To the extent that can presently be determined (excluding very small dischargers).

SOURCE: Survey of the IFO-Institute (based on statements by the Federal/Laender task forces in accordance with Section 7a FWA).


EXPANSION OF PURIFICATION FACILITIES OF VARIOUS ORDERS OF MAGNITUDE (SE=DU=DAMAGE UNIT)
Marginal Cost of Purification (DM/Damage Unit) Mid-1970's Prices
Charge (DM/DU)
130
120
110
100
90
80
70
60
50
40
30
20
10
X
V
Plant for 50,000 Inhabitants
Plants for Several Small Municipalities
Charge (40DM/DU)
Charge (40DM/DU)
Y
Z
G
E
D
A
C
F
H
100
96
94,5
81
75
55
55
69
75
93
94,5
100
90
80
70
60
60
70
80
90
100
(%) Deg. of Purification DU
Regulation (75% Purif.)
Deg. of Purif. (%)
(75% Purif.)

APPENDIX B

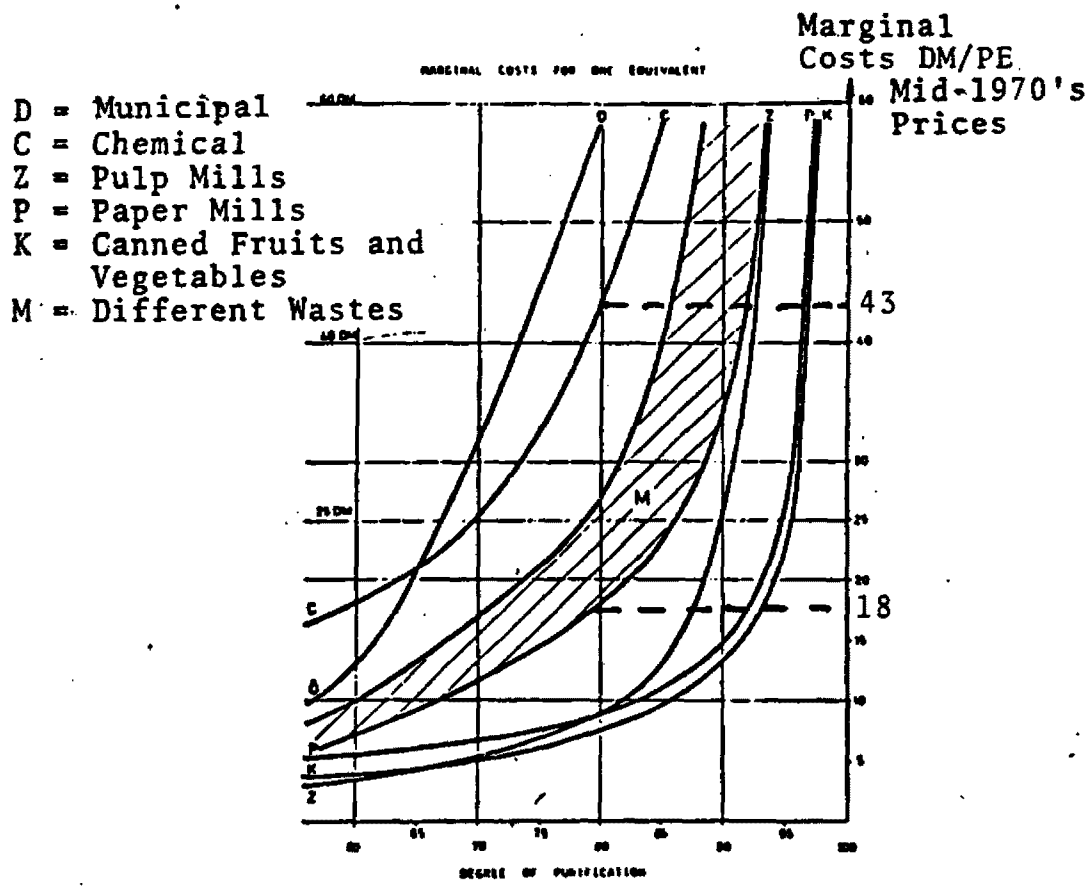


FIGURE B.2

MARGINAL COSTS FOR THE AVOIDANCE OF ONE EQUIVALENT

APPENDIX C

THE LEGAL AND INSTITUTIONAL SETTING IN THE FRG

The FRG is a federal nation-state composed of 11 Laender: Schleswig-Holstein, Hamburg, Lower Saxony, Bremen, North Rhine-Westphalia, Hessen, Rhineland-Palatinate, Baden-Wuerttemberg, Bavaria, Saarland, and West Berlin.

The FRG, under the Basic Law, is a decentralized nation; power is divided along certain lines between the federal government and the Laender, or states. We will examine this governmental structure from the viewpoint of water management and will analyze the legal competence to legislate and regulate over water resources from that viewpoint.

The Bundestag (Federal Parliament)[1] has the power to pass framework legislation in the area of water management/protection of water quality. Because water law in Germany was historically the exclusive precinct of the Laender, these governments have been reluctant to give it up. Consequently the Bundesrat (Federal Council)[2], which normally has only the power to initiate legislation in the Bundestag and has veto power over Bundestag legislation, but which is politically tied to the interests of the Laender, has been given extraordinary powers with regard to the setting of standards pursuant to FWL Art. 7a(1).[3] This allocation of power is merely one of several indications of the political compromise that the federal water quality legislation represents.

The executive arm of the government, the Chancellor and his cabinet, is traditionally the product of a coalition between one of the major national political parties and a sufficient number of smaller parties, who together form a majority in the Bundestag and are thereby in a position to elect the Chancellor. The Chancellor in turn appoints the ministers who make up the cabinet. The Chancellor and the cabinet constitute the government for as long as their policies are acceptable and they avoid a no-confidence vote in the Bundestag.

The Ministry of Interior has federal responsibility under the 1976 FWL Amendments and the ECL for the government's water quality management program. The Ministry of Interior is different than the U. S. Department of the Interior in that the German Ministry has no regional offices located in the Laender and exercises far less political clout in that arena than its U. S. counterpart.

The Ministry of Interior is advised on environmental and water quality matters by another federal agency, located in the Ministry of Interior, the Umweltbundesamt (Environmental Agency). This agency is also very different than its U. S. counterpart, the Environmental Protection Agency. The U. S. agency has very

substantial enforcement powers under the Clean Water Act, Clean Air Act, Environmental Policy Act, and others. The FRG Umweltbundesamt is an advisory agency only. It has no enforcement powers. In fact, its very existence has been contested by the Laender because it was not listed in the Act which created the Ministry of the Interior.[4]

The FRG's government is limited in the power it may assume in the water law area by the legislative competence that it is given in the Basic Law. This Law divides the legislative competence into four areas. In the first area the federal government has exclusive competence (foreign affairs, national citizenship, commerce with foreign countries, postal affairs, the national railroads and air transportation, currency, copyrights and patents, etc.). In the second area, the federal government and the Laender have concurrent legislative competence (civil, criminal, and real estate law, health and welfare, local commerce and natural resource development, electrical production --including nuclear plants--road construction and maintenance, traffic control, land-use regulation, and other enumerated areas). In the third instance the federal government's competence is limited to the enactment of "framework" legislation (water management, press and film industries, land distribution, regional planning, public services, etc.). The fourth category consists of matters that are reserved wholly to the Laender.

Of significance here is the fact that in the area of water management the federal government has neither exclusive nor concurrent legislative competence: if it had exclusive competence it would have total control over water quality management; if it had concurrent competence it could preempt Laender laws to the extent that a uniform national approach to the problem was required. However the Basic Law provides only for federal "framework" competence,and thus the principal responsibility for water pollution control remains where it has been traditionally, in the Laender.

It is precisely this concept of "framework" legislation that makes the German program of water pollution control so difficult to understand in legal terms. The ramifications of framework competence and the allocation of legal authority between the federal government and the Laender is still murky even to German scholars, because its use in the water management area is still so new, untried, and "in process".[5]

APPENDIX C -- FOOTNOTES

1. The Bundestag is the primary legislative arm of the FRG. Its members are elected to four-year terms and they are responsible for electing the Chancellor.

2. The Bundesrat is composed of representatives of the Laender governments who vote as a block according to the instructions of the local governments they represent.

3. Basic Law, Article 129 and FWL, Article 7a(1).

4. Professor Dr. E. Rehbinder, J. W. Goethe-Universitat, Frankfurt, letter of January 13, 1983.

5. F. J. Peine, "Die Pflicht der Laender zum Vollzug des Abwasserabgabengesetzes" (The Duty of the Laender to Implement the Effluent Charge Law), Natur und Recht 4, p. 143.

FOOTNOTES

* We are grateful for the translation services of Casey O'Rourke and research assistance and translation services of Barbara Fritzemeier. Extensive comments on various drafts were provided by Blair Bower, Will Irwin, Marvin Kosters, Allen Kneese, J. Salzwedel, E. Rehbinder, H. Massing, F. Schendel, M. Uppenbrink, H. Luhr, F. Schroeder, G. Gedlitschka, W. Kitschler, H. Roth, J. Gilles, C. D. Malloch, Michael DeBusschere, Malte Faber, Lutz Wicke and W. Dorau.

1. J. Koelble, Gewaesserschutz in der Gesetzgebung (Water Protection in the Law), undated, p. 6.

2. See Government of the Federal Republic of Germany, "A Program for the Protection of the Human Environment" (1971), pp. 72, 74, 75 (hereinafter cited as PPHE); L. Dinkloh, ("Stand des Gewaesserschutzes 1982 in der Bundesrepublik Deutschland aus der Sicht der Gesetzgebung" (Conditions of Water Protection Law in Germany in 1982 in View of the Legislation). Vortrag Jahrestagung 1982, Fachgruppe Wasserchemi (May 1982). Everyone interviewed agreed that water quality in the early 1970s was unacceptable. Disagreement occurs over the solution.

3. PPHE, supra note 2.

4. Interview with Dr. H. Massing, Duesseldorf, September 21, 1982.

5. Interview with Dr. H. Massing, Duesseldorf, March 16, 1983; interview with Dr. M. Uppenbrink, Dr. H. P. Luhr, and Dr. Kanowski, Umweltbundesamt (EPA), Berlin, March 17, 1983.

6. For the broad powers sought, see PPHE, pp. 72-73. Some discussion of the problems arising from limited federal competency is found in R. W. Johnson and G. M. Brown, Jr., Cleaning Up Europe's Waters: Economics, Management, Policies. Pub. by Praeger Publishers (1976)(hereinafter cited as Johnson and Brown).

7. Interview with Massing, supra note 5; interview with Dr. J. Salzwedel, Institut fuer das Recht der Wasserwirtschaft an der Universitaet Bonn, Bonn, March 15, 1983.

8. Interview with Massing, supra note 5; interview with Uppenbrink, Luhr, and Kanowski, supra note 5.

9. There is a feeling in the FRG that once a consensus on the need for legislation is achieved, the various parties are more inclined to work in cooperation toward the common goal than in the United States where a more adversarial philosophy seems to operate. Interview with Uppenbrink, Luhr, and Kanowski, supra note 5.

10. Interview with Dr. W. Kitschler, Dr. H. Roth, and Dr. J.

Gilles, Ministry of Interior, Bonn, March 15, 1983; interview with Salzwedel, supra note 7.

11. References relied on in the next few paragraphs are Johnson and Brown, supra note 6, p. 122; V. Boehm, "Interim Report on the Draft of an Effluent Charge", No. 6 (June 1976), pp. 163-65; K-H. Hansmeyer, et al., Economic Problems of Environmental Protection Policy (1976), pp. 92-95; interview with H. Sander, Bundesverband der deutschen Industrie e.v. (BDI), Cologne, March 14, 1983. The BDI is an industrial association representing approximately 80,000 private industrial enterprises. It acts as a political interest and advisory group and is instrumental in determining national economic policy.

12. Interview with Salzwedel, supra note 7.

13. It subsequently has been discovered that a proportional relationship seems to exist between these two metals and other heavy metals. Interview with Uppenbrink, Luhr and Kanowski, supra note 5.

14. Interview with Kitschler, Roth and Gilles, supra note 10.

15. See K-G. Malle, "Sind Abgaben ein geeignetes Instrument der Umweltspolitik?" (Are Charges an Appropriate Environment Policy Tool?) Umwelt (1982), p. 35

16. Translated from Gewaesserguete Karte der Bundesrepublik Deutschland, Ausgabe 1976 (Water Quality Map of the Federal Republic of Germany, 1976 Edition). There are four classes of water. Class I is oxygen saturated, low in nutrients, and supports high quality fish; Class II is defined in the text; Class III is heavily polluted; Class IV is excessively polluted. The Federal Republic of Germany uses a method of classifying water quality developed by Kolkwitz and Marssond and revised by Liebmann. See H. Liebmann, "Die Notwendigkeit einer Revision des Saprobiensystems und deren Bedeutung fuer dieWasserbeurteilung" (The Necessity of a Revision of the Saprob Systems and Its Importance to the Classification of Waters). Gesundheits-Ingenieur 68 (1947). References provided by Dr. H. Massing.

17. FWA, Article 2(1).

18. J. Koelble, supra note 1, at pp. 16 and 18.

19. FWA, Article 8(2).

20. FWA, Article 4(1), -(2); Article 18.

21. ECL, Article 4(1).

22. J. Schilling, "Zusammenhang zwischen Rahmenplanung, Bewirtschaftungsplaenen und Abwasserbeseitigungsplaenen" (The Relationship Between General Water Plans, Water Utilization Plans and Waste Water Disposal Plans), in Berichte der abwassertechnischen Vereinigung E.V., Tr. 32, ATV Hauptversammlung, Mainz, 1980 (Reports of the Waste Water Technical Association, Proceedings of the Annual Conference), pp. 216 and 222.

23. Ibid. at p. 216. Another provision of the Act authorizes the Laender to require industries to use public sewerage systems, or the treatment plants of third parties. FWA, Article 18a(2).

24. FWA, Article 18.

25. FWA, Article 22(1).

26. FWA, Article 41.

27. Menke-Glueckert reports that there were only seven dissenting votes in the Bundestag and they wanted a more strict effluent charge law. See Menke-Glueckert, "Stand der Vorbereitungen zum Inkrafttreten des Abwasserabgabengesetzes" (Status of the Preparations for the Implementation of the Effluent Charge Law), in Berichte der abwassertechnischen Vereinigung E.V., Tr. 32, ATV-Jahreshauptversammlung, Mainz 1980 (Reports of the Waste Water Technical Association, Proceedings of the Annual Conference, Mainz 1980).

28. Interview with Professor Dr. J. Salzwedel, Institut fuer das Recht der Wasserwirtschaft an der Universitaet Bonn, Bonn, September 22, 1982.

29. The states typically set forth criteria to which municipality pricing policies should adhere as a condition for receiving a discharge permit. But the criteria are so broad that the legal link is weak between the indirect discharger's payment and the municipality's cost of managing its waste.

30. Document titled "Structure and Effectiveness of the Waste Water Charge Act", no date or author provided. Dr. J. Salzwedel also has discussed the principle of precaution during an interview, Washington, D. C., July 7, 1982. He explained that the idea behind a minimum standard which all must follow is that it helps to prevent a deterioration of water quality.

31. Undated Document, supra note 30.

32. Discharge rights are water rights under German law.

33. The requirement that charge relevant data be included on the permit grew out of debate on the floor of the Bundestag. The provision is intended to minimize the administrative burden imposed on the Laender by the ECL. H. Dahme "Wasserrechtliche Zulassung und Abwasserabgabe" (Water Rights and the Effluent Charge), in Berichte der Abwassertechnischen Vereinigung E. V., Tr. 32, ATV Jahreshauptversammlung, Mainz 1980, p. 42. See also K. Berendes, "System und Grundprobleme des Abwasserabgabengesetzes" (System and Basic Problems of the ECL), Die oeffentliche Verwaltung 19 (1981), p. 751.

34. Table reproduced from B. T. Bower, R. Barre, J. Kuchner and C. S. Russell, Incentives in Water Quality Management: France and the Ruhr Area (1981), p. 301. Other pollutants for which minimum requirements may be established for some industries include: BOD, hydrocarbons, phenols, cyanide, heavy metals, halogenated hydrocarbons, sulfide, ammonia, fluoride, phosphorus, and total suspended solids. See H. Hornef and S. Kanowski, "New Federal Waste Water Discharge Standards in Germany", Effluent and Water Treatment Journal (November 1981), p. 513 (hereinafter cited as Hornef and Kanowski).

35. For settleable solids:
10,755,000 m^3/Yr - 15 ml/<l>(1 damage unit/m^3) = 1613 damage units.
For COD:
10,755,000 m^3/Yr - (700 mg/<l>) - 2.2 damage units/100kg = 165,627 damage units.

Help in understanding the computations was obtained during an interview with Dr. W. Dorau, Umweltbundesamt, Berlin, September 30, 1982 and in correspondence, December 15, 1982.

36. See ECL, Article 9(4).

37. H-P. Luehr, Auswirkungen des Abwasserabgabengesetzes auf die Gemeinden (Effect of the Effluent Charge Law on Municipalities), Die niedersaechsische Gemeinde, No. 4 (April 1978), p. 96.

38. G. Boehnke and P. Doetsch, "Einfuehrungsvortrag: Erlaeuterung zu den Begriffen: Niederschlagswasser, Jahresschmutzwassermenge, Schadeinheiten, Bezugswert, usw" (Introduction: Definitions of the Concepts: Runoff, Annual Waste Water Volume, Damage Units, Reference Values, etc.), in Berichte der abwassertechnischen Vereinigung E. V., Tr. 32, ATV Jahreshauptversammlung, Mainz (1980).

39. The new standard value is the old level increased by one-half the amount by which the maximum exceeded the old minimum. See ECL, Article 4(4).

40. See ECL, Article 4(5).

41. ECL, Article 9(6).

42. Letter from Axel Szelinski, written on behalf of M. Uppenbrink, January 20, 1983, p. 4.

43. G. Rincke, "Untersuchung ueber wirtschaftliche Auswirkungen der vorgesehenen Abwasserabgabe auf abwasserintensive Produktionszweige" (Study of the Economic Effects of the Expected Effluent Charge on Effluent Intensive Branches of Production) (February 1976).

44. See D. Ewringmann, K. H. Hansmeyer, V. Hoffmann, and K. Kibat, Auswirkungen des Abwasserabgabengesetzes auf industrielle Indirekteinleiter (Effects of the Effluent Charge Law on Industrial Indirect Dischargers), Umweltbundesamt, Berichte 2/81 (1981), p. 14.

45. Ibid. at p. 20.

46. Institut fuer Wasser-Boden-und Lufthygiene des Bundesgesundheitsamtes, "Hinweise zur Erarbeitung der Mindestanforderungen nach Artikel 7a WHG durch die Arbeitsgruppen fuer einzelne Industriebereiche" (Suggestions for the Establishment of Minimum Standards Under the FWA, Article 7(a)

Through the Task Forces for Specific Industries), Berlin 9/20/77.

47. The minimum standards for municipalities are found in the relevant task force report, "Erste Allgemeine Verwaltungsvorschrift uber Mindestanforderungen an das Einleiten von Schutzwasser aus Gemeinden in Gewaesser-1. Schmutzwasser VwV," January 24, 1979. (First General Administative Regulation Regarding the Minimum Standards for the Dischage of Effluent by Municipalities into the Waters - First Effluent Regulation) It was reported that these standards are equivalent to 93 percent removal of BOD_5 for small communities and 94.5 percent for large cities. Interview with F. Schafhausen, Umweltbundesamt (EPA), Berlin, November 25, 1982.

48. One-half of the firms in the IFO study, directly discharging pollutants into waters, reported they had participated in the task force groups. See R-U. Sprenger and M. Pupeter, "Evaluierung von gesetzlichen Massnahmen mit Auswirkungen im Unternehmensbereich" (Evaluation of Legal Measures with Consequences in the Business Sector), IFO-Institut fuer Wirtschaftsforschung, Munich (May 1980).

49. It is true that the Laender could frustrate the intentions of the federal government by delaying implenmentation, but there are clear legal limitations to this strategy.

50. Data obtained during interview with J. Gilles, Bundesministerium des Innern, Bonn, September 22, 1982, and through correspondence December 20, 1982.

51. A more complete treatment of water quality management systems is available in A. Kneese and B. Bower, Managing Water Quality (1968); A. M. Freeman III, R. Haseman, and A. Kneese, The Economics of Environmental Policy (1973).

52. Strategies for avoiding effluent charges include better waste treatment technologies, different production techniques, different inputs and an altered output mix or level.

53. Additionally, the marginal value of a given water quality characteristic is equated across all beneficiaries when the quality characteristic is not a collective good.

54. D. Ewringmann, K. Kobat und F. J. Schafhausen, Die Abwasserabgabe als Investitionsanreiz (The Effluent Charge as a Stimulus to Investment), Umweltbundesamt, Berichte 8/80 (1980), p. 62.

55. Rat von Sachverstaendigen fuer Umweltfragen (The Council of Experts for Environmental Questions), "Die Abwasserabgabe, wassergutwirtschaftliche und gesamtoekonomische Wirkungen, Sondergutachten" (The Effluent Charge: Effects on Water Quality Management and the General Economy) (1974), p. 70.

56. Interview with Professor G. Rincke, formerly Technische

Hochschule, Darmstadt, September 23, 1982.

57. Interview with L. Wicke, Umweltbundesamt, Berlin, September 29, 1982; and interview with Dr. Klaus Zimmermann, International Institute for Environment and Society, Berlin, September 29, 1982. Correspondence with Dr. Zimmermann, December 3, 1982, provided the 1986 estimate.

58. G. Rincke, "The German Federal Law on Wastewater Charges", Prog. Wat. Tech. 10, Nos. 3/4 (1978), pp. 95-102. See also Appendix B, Figure 3.2.

59 See Dr. Lutz Wicke, "The Experience with the German Effluent Charge System in the Light of Irish Considerations in that Field", Lecture at Dublin University, April 15, 1983.

60. This conclusion is based on the discussion of Wicke with regard to the treatment cost functions exhibited in Appendix B, Figure 3.1, and estimates of treatment costs by Niemes. See L. Wicke, "Zur Bedeutung von Abwasserabgabe und Entwaesserungsgebuehren fuer die Effizienz der Kommunalen Entwaesserung" (Concerning the Significance of the Effluent Charge and Sewerage Fees for the Efficiency of Municipal Sewerage), Finanzarchiv 39. No. 1 (1981), p. 101; and H. Niemes, Umwelt als Schadstoffempfaenger (Environment as Receive of Waste Materials), 1981.

61. Interview with Dr. Ing. W. Haltrich and Dr. K-G Malle, BASF, Ludwigshafen, September 24, 1982.

62. Correspondence with Professor Dr. M. Faber, March 10, 1983; interview with Professor Dr. M. Faber, Dr. H. Niemes and Dr. G. Stephan, Department of Economics, University of Heidelberg, Heidelberg, September 27, 1982.

63 Blair Bower noted in correspondence (April 9, 1983) that Dow Chemical Co. in the U. S. began an intra-firm effluent charge policy in 1958.

64. Correspondence with W. Haltrich, December 7, 1982.

65. R-U. Sprenger and M. Pupeter, "Evaluierung von gesetzlichen Massnahmen mit Auswirkungen im Unternehmensbereich" (Evaluation of Legal Measures with Consequences in the Business Sector), IFO-Institut fuer Wirtschaftsforschung, Munich (May 1980). See also Ewringmann, Hansmeyer, Hoffmann, and Kibat, Berichte 2/81 supra note 44, and H. Hoffmann and D. Ewringmann, Auswirkungen des Abwasserabgabengesetzes auf Investitionsplanung und Abwicklung in Unternehmen, Gemeinden und Abwasserverbaenden (Effects of the Effluent Charge Law on Investment Planning and Arrangements in Firms, Municipalities and Effluent Associations), Study prepared for the Umweltbundesamt (EPA) (1977).

66. See Ewringmann, Hansmeyer, Hoffmann and Kibat, Berichte 2/81, supra note 44.

67. See PPHE, supra note 2, and P. Menke-Glueckert, "Status of the Preparations for the Implementation of the Effluent Charge Law", supra note 27.

68. Correspondence from L. Wicke and M. Dorau, March 10, 1983.

69. Estimates obtained during interviews with F. A. Schendel, Bayer A. G., Leverkuesen, March 14, 1983; M. Schell, Ministerium fuer Ernaehrung, Landwirtschaft und Forsten, Schleswig-Holstein, Kiel, March 16, 1983; and W. Baumgaertner, Ministerium fuer Ernaehrung, Landwirtschaft und Umwelt, Baden-Wuerttemberg, Stuttgart, March 18, 1983.

70. FRG, Umweltbundesamt (EPA), "Structure and Effectiveness of the Waste Water Charges Act", Berlin (June 28, 1982), p. 6. A comparison of the maps led us to the same conclusion. See Gewaesserguetekarte der Bundesrepublik Deutschland, Ausgaben 1976 and 1980 (Water Quality Map of the Federal Republic of Germany, 1976 and 1980).

71. Estimate provided by Schendel, supra note 69. Excerpts of document provided by one interviewee contained an estimate of 650 million DM for the two years 1981 and 1982.

72. The first estimate was contained in the document referred to above, supra note 71. The second estimate was provided during the interview with Baumgaertner, supra note 69.

73. According to Article 13 of the ECL, the revenues can be used only for that portion of the administrative expenditure associated with enforcement of the Act and for the Lender's own supplementary regulations. Some believe that a free interpretation of this clause will siphon off "too much" revenue for administration.

74. The application to support investment in specialproduction processes is described in F. Boelam, "Interim Report on the Draft of an Effluent Charge Law", Wastewater Correspondence 23 (June 1976).

75. Data obtained during interviews with F. Schendel, supra note 69, C. A. Conrad, Schleswig-Holsteinischer handeskreistag, Kiel, March 1983, and Baumgaertner, supra note 69.

76. Interview with Massing, supra note 4.

77. Johnson and Brown, supra note 6, pp. 126-27; Bower et al., supra note 34, pp. 237-40, 270-71 and interview with Michaelis, Ruhrverband, Essen, September 22, 1982; interview with F. Schroeder, Bavarian Ministry of Interior, Munich, September 28, 1982. In extraordinary circumstances, the subsidy for waste treatment plants has been as high as 80 percent. Correspondence with P. Michaelis, December 7, 1982.

78. Kneese and Bower, supra note 51.

79. W. Baumol and W. Oates, The Theory of Environmental Policy (1975), p. 154. To support their view they refer the reader to the history of tax changes.

80. Viz. Dorau, supra note 35. Discussion with Faber and Niemes, supra note 62, was particularly helpful in thinking about the merits of joint use of standards and charges.

81. See Wicke, supra note 60.

82. Umweltbundesamt (EPA), "Structure and Effectiveness of the Waste Water Charges Act" (June 28, 1982). In preparation for the new laws, planning games were designed to acquaint those enforcing and those potentially liable with the new regulations.

83. For an interesting discussion of compliance avoiding behavior, see D. Lee, "Protecting Our Environment: Some Public Choice Considerations", paper presented at a conference on Market Perspectives in Natural Resources Economics, Political Economy Research Center, Montana State University, Bozeman, June 10-14, 1982. Also of interest is W. Viscusi and R. Zeckhauser, "Optimal Standards with Incomplete Enforcement", Public Policy 27, No. 4 (Fall 1979), pp. 437-56.

84. Interview with Schroeder, supra note 77 and Schell, supra note 69.

85. Interview with Baumgaertner, supra note 69.

86. Correspondence with Dr. W. Haltrich, December 7, 1982.

87. P. Menke-Glueckert, "Status of the Preparations for the Implementation of the Effluent Charge Law", supra note 27.

88. Interview with Dr. P. Menke-Glueckert, Federal Ministry of Interior, September 20, 1982, and correspondence January 12, 1983.

89. Interview with Salzwedel, supra note 28.

90. Parenthetically, we were told that environmental interests were presented by individuals and public agencies but not by the active involvement of organized environmental groups. The political activisim of environmentalists is a recent manifestation and is illustrated by the advent of the "Green" party.

91. Allen Kneese rightly suggested that a comparison of the process leading to the major water laws in the U. S. and the FRG might be instructive. He also directed us to the excellent study of Marc Roberts, "The Political Economy of the Clean Water Act of 1972: Why No One Listened to the Economists", in Utilization of Social Science in Policy Making in the United States, OECD

(1974).

92. Interview with Massing, supra note 4.

93. Interview with Schroeder, supra note 77 and correspondence from Schroeder, December 5, 1982.

94. See Ewringmann, Hansmeyer, Hoffman and Kibat, Berichte 2/81, supra note 44, p. 12.

95. Interview with Conrad, supra note 75; O. Behrend, Ltd. Ministerialrat, Kiel, March 16, 1983; and T-W. Krahl, Deutscher Staedtetag, Landesverband Schleswig-Holstein, Kiel, March 16, 1983.

96. Interview with Salzwedel, supra note 28.

97. Interview with D. Ewringmann, Finanzwissenschaftliches Forschungsinstitut an der Universitaet zu Koeln, Koeln, September 21, 1982.

98. Interview with R. Sprenger, IFO-Institute for Economic Research, Munich, September 28, 1982.

99. Interview with Schroeder, supra note 77.

100. Could the rise to greater prominence of "technocrats" lead to their pursuing their own goals of even cleaner water at the expense of society? Veblen warned about such a danger in his discussion of engineers. The relevant question here is whether an effluent charge encourages or discourages such misdirected enthusiasm. See T. Bevlen, The Engineers and the Price System (1963), particularly Chapter VI, "A Memorandum on a Practicable Soviet of Technicians." The new monetary and measuring procedures are being developed by The German Standards Institute. See Bundesministerium des Innern, "Requirements to be Met by Effluent Discharges Into Waters Pursuant to Article 7a, Paragraph 1 of the Federal Water Act (WHG),"undated.

101. Ewringmann, Hansmeyer, Hoffmann and Kibat, Berichte 2/81, supra note 44.

102. Interview with Ewringmann, supra note 97.

103. Ewringmann, Hansmeyer, Hoffmann and Kibat, Berichte 2/81, supra note 44, pp. 12-13.

104. G. Rincke, "Die Abwasserabgabe in der kommunalen Gebuehrensatzung" (The Effluent Charge in the Municipal Fee-Regulation), in Berichte der abwassertechnischen Vereinigung E.V., Nr. 32, ATV-Jahreshauptversammlung, Mainz (1980).

105. G. Rincke, Abwasser: Technische Alternativen zur Beurteilung der Abwasserabgabe (Effluent: Technical Alternatives to Distribution of the Effluent Charge), Umweltbundesamt,

Berichte 2/81 (1981).

106. Ewringmann, Hansmeyer, Hoffmann and Kibat, Berichte 2/81, supra note 44, pp. 20-21.

107. Less than one-half of the communities covered their costs, net of subsidies, with fees in the 1976-1978 period. See Ewringmann, Hansmeyer, Hoffmann, and Kibat, Berichte 2/81, supra note 44, p. 14.

108. Interview with Ewringmann, supra note 97.

109. G. Rincke, "The Effluent Charge in the Municipal Fee-Regulation", supra note 104.

110. Interview with Michaelis, supra note 77.

111. See supra note 46.

112. The point was emphasized by Dr. Dorau and Dr. Wicke in personal correspondence, March 10, 1983.

113. Menke-Glueckert reports that ground water extraction by industry has doubled in the last four years. One hopes this abrupt change arises for natural reasons and is not a result of the effluent charge laws. P. Menke-Glueckert, "Status of the Preparations for the Implementation of the Effluent Charge Law", supra noe 27, p. 5.

114. The 1977 book Environmental Improvement Through Economic Incentives, F. Anderson and coauthors, published by Johns Hopkins University Press contains an excellent analysis of the use of money charges to discourage environmental harm and the practical problems posed in the United States by different implementation strategies. We refer the reader to this work for a fuller analysis of some of the problems discussed here.

115. Nowak, Rotunda and Young, Constitutional Law (West Publishing Co. 1977), p. 244.

116. Anderson and coauthors, supra note 114, pp. 130-31.

117. U. S. Const., Art. VI, Cl. 2.

118. See Anderson and coauthors, supra note 114, p. 131 (same conclusion).

119. Ibid., pp. 166-72.

120. The Bundesrat is composed of representatives of the Laender governments, but in other ways the Bundesrat resembles the U. S. Senate.

121. The small number of pollutants, the escalation of prices, and the availability of revenues for abatement expenditures are

qualities of the French effluent charge system. See Johnson and Brown, supra note 6 and Bower et al., supra note 34.